LINCOLN COUNTY PDA

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PLANNING AREA ANALYSIS

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.1 Introduction

The Planning Area Analysis (PAA) is intended to serve as a medium for analyzing and displaying the relationship between social and economic facts presented in the Social-Economic Profile (SEP) and the physical and biologic data of the Unit Resource Analysis for a Bureau of Land Management (BLM) planning area. The data is analyzed from an economic and a social viewpoint to determine the relative significance of each resource activity and its importance to the local and national communities. The PAA also uses data developed in the SEP to further examine the human parameters of the environment. BLM relationships, critical environmental areas, and significant problems and issues are summarized at the end of the PAA.

Each resource activity was analyzed for significance in terms of production, employment, and income generated from a local, regional, and national viewpoint. In addition, cultural values were identified through a socio-cultural study of Lincoln County. Social well-being was examined in comparison to the State's well-being indicators.

This document should be viewed as a part of a total planning process. The final goal is a Management Framework Plan (MFP).

One basic repository of data is the Unit Resource Analysis (URA) which was prepared as an inventory of resource data in map overlay and narrative form. A second basic information document was the SEP which was prepared for Lincoln County. This SEP provides social, cultural, and economic data about the county to analyze the physical resources within the resource area in light of the human environment.

The MFP is then developed from the URA and PAA. This MFP, after public review and official approval, will serve as a master plan for land management in the planning unit for the next few years.

The PAA should serve as an indicator of the present impact of management, provide a basis for estimating impact because of change, and specify future demands and public desires. Finally, the PAA should serve as a transition from the URA to the MFP, especially Steps 1 and 2, which display objectives, rationale, and management decisions.

.2 Social Economic Analysis and Economic Demand Projections

This section is subheaded by resource activity:

.21 Lands
.22 Minerals
.23 Woodland Products
.24 Range Management
.25 Watershed (Reserved)
.26 Wildlife
.27 Recreation

Watershed is reserved because the Bureau of Land Management (BLM) has not yet adopted procedures for indicating significance and community impact of watershed management (such as forage benefits, erosion control, stream control, etc.).

All the other resources ae analyzed according to production, income, employment, and population. BLM resources are analyzed for significance and projected future demand. Where current or future use is considered significant, additional analysis of the demand for goods and services is prepared.

.21 Lands

A. Quantifiable Land-Use Classes

The Caliente Planning Unit includes 3,414,106 acres of public land which constitutes 98 percent of the total area in the planning unit.

Urban-Suburban: Interspersed in public land are six rural communities encompassing 2,317 acres of privately-owned land that can be considered "urban-suburban". Of this total, 630 acres are developed. Table PAA-1 identifies total acreage and vacant land by community.

Agriculture: The State Board of Equalization records for 1975 identify 74,323 acres of taxable agricultural land in Lincoln County; this includes cropland used for pasture, woodland pasture, and other pasture. Prorated to reflect that 61 percent of the county area is in the Caliente Planning Unit, it can be estimated that there are 45,340 acres of privately-owned agricultural land in the planning unit. A total of 58,320 acres of the agricultural land in the county is in use; on a prorated basis 35,575 acres of designated agricultural land in the planning unit is utilized.

Utility Systems: Since 98 percent of the planning unit is administered by the BLM, the bulk of all utility easements must cross public land. Public land is significant for this land-use class.

Other Land Uses: The Land Ownership and Current Land Use sections of the URA (Step 3) enumerate the various land uses on public land. The public land is utilized almost exclusively for both communication sites and public purpose projects and is, therefore, significant for these uses. There are 25 communication sites and one sanitary landfill authorized in the planning unit. There are three major modified sanitary landfills, located near Panaca, Alamo, and Ash Springs, which are unauthorized.

B. Non-Quantifiable Land Uses

The moratorium on agricultural entry applications that has been in effect since 1964, and the subsequent multiple-use classification which has segregated all but 23,045 acres of the public land in the planning unit from agricultural entries, have precluded one primary method of transferring public land into private ownership.

Other methods of transferring public land into private ownership include the Carey Act, Recreation and Public Purposes Act, and public sale under the Federal Land Management & Policy

Table PAA-1

CALIENTE PLANNING UNIT
Lincoln County Community Land Use

Alamo	168 acres	92 acres vacant
Ash Springs	37 acres	19 acres vacant
Caliente	867 acres	709 acres vacant
Panaca	382 acres	147 acres vacant
Pioche	183 acres	72 acres vacant
Tempiute Valley	680 acres	640 acres vacant

Source:
Willie and Associates, Lincoln County Master Plan, 1975. (adjusted)
BLM, Las Vegas (1978).

Act (FLMPA) of 1976 (PL 94-579). Currently there are no federal regulations to implement the sale authority of the FLMPA and final regulations for the Carey Act are yet to be approved. The Recreation and Public Purposes Act continues to be a vehicle for qualified applicants (State, County, Municipalities, nonprofit organizations) to obtain public land for recreation and public purposes.

C. Regional Trends

Even though Lincoln County is adjacent to the most populated county in Nevada, there is no indication that this proximity will have any effect on residentiary-based demands within the planning unit. The population in Clark County is localized in the Las Vegas Valley and has a limited effect on the rest of the region. The only projected influence that the population concentration in Las Vegas will have on Lincoln County involves tourist-oriented activities.

The Los Angeles Department of Water and Power (LADWP) and the Lincoln County Power District have projects that contemplate easements across the planning unit. LADWP is projecting construction of two parallel 500 kilovolt (kv) lines as part of the Intermountain Power Project (IPP). These lines are needed to supply power to the rapidly growing Southern California area. The Power District is considering the construction of a 230 kv line through the northeast section of the planning unit plus several extensions of the existing 69 kv grid.

Temporary demands could be placed on communities within the planning unit during the construction phases of the proposed powerlines. These demands would be placed on such facilities as motels, grocery stores, restaurants, etc.

D. Significance

Table PAA-2 illustrates the significance of different categories of land use in providing for income and employment in Lincoln County. Urban and suburban lands accounted for over three-fourths of income and employment in 1975.

E. Local Demand Analysis

Since 98 percent of the Caliente Planning Unit is public land, it is projected that growth will create demand on the public land. Most of this demand will be localized around the remaining two percent of private land because it contains the population centers. It is possible to identify the demand centers since 90 percent of the population lives within the communities in the planning unit. There are six communities, and it is necessary to analyze each to gain the proper perspective on local requirements.

Table PAA-2

CALIENTE PLANNING UNIT
Land Use Related Employment and Income in Lincoln County
(1975)

	Employment[1] Persons	%	Income[3] $1,000	%
Urban and Suburban Lands				
Construction	10	1	112[3]	2
Manufacturing	20	2	223[3]	4
Trade	150	19	987	14
Finance Insurance and Real Estate	6[3]	1	68	1
Services	80	10	1012[3]	14
Government	340	42	3414	48
Other	5[3]	1	58	1
Total	611	76	5874	84
Agricultural Lands				
Agriculture	100	12	85	1
Utility				
Transportation, communication and Pub Inc. Utilities	90	11	1074	15
Total	801	100	7033	100

1/ Nevada Employment Security Department (NESD), 1975.
2/ U. S. Bureau of Economic Analysis (BEA), 1975.
3/ Estimates calculated by BLM, Las Vegas, 1978.

The Lincoln County Master Plan (1975) provides a basis for projections of demand to 1990. Growth throughout the planning unit is predicted to be moderate and is generally associated with potential increases in mineral production. Total population growth and consequently, local demand for public land is based on a population-employment ratio of 2.83.

Urban-Suburban

Alamo: Alamo encompasses 167 acres and has 510 residents, which creates a population density of 3.05 people per acre. However, the total occupied acreage is 32 acres, which establishes an average net density of 15.94 people per acre.

The opening of the tungsten mine at Tempiute has caused the population of Alamo to double. The Lincoln County Master Plan expects an additional increase to 800 residents by the end of 1978. It estimates that Alamo has the capacity to support a total population of 1,750 people on its present acreage. This appears to be adequate through the planning period to 1990. The population increase has strained the capacities of the post office, schools, churches, and community buildings. An additional 10 to 13 acres will be required for these purposes. There are no public recreation facilities in Alamo other than those maintained by the schools and churches. The Lincoln County Master Plan identified the 1990 community recreation acreage requirements as 22.2 acres.

Caliente: The corporate limits of Caliente include 867 acres. Current population is approximately 900 residents. The overall population density is approximately one person per acre. This figure, however, is misleading for two reasons: about 75 of the residents are located at the Nevada Girls Training Center, and the 269 houses and mobile homes in Caliente are on lots totaling 40 acres. Therefore, the average net densities are 20.6 people per acre or six residences per acre.

Since Caliente has a broader economic base than the other communities in the planning unit, it has the greatest potential for steady growth. The Lincoln County Master Plan projects that moderate growth will raise the population to between 1,261 and 1,346 people. At the present density of six residences per acre, and considering the average family size as 3.2, an increase of 360 to 445 residents could be accommodated on approximately 18 to 23 acres (including roads). An additional three to four acres are projected for commercial expansion. With 708 acres of vacant privately-owned land in Caliente, it can be expected that not only the residential and commercial land needs for the projected increase in population can be satisfied, but also the corresponding requirement for public purpose land.

Panaca: Panaca is a community with 382 acres and 539 residents. This establishes a gross population density of 1.4 residents per acre; however, the 194 residences in the community are on lots totalling 28.2 acres. Therefore, the net densities are 19 people per acre or 6.9 residences per acre.

The Lincoln County Master Plan projects moderate growth in Panaca township. Population is expected to reach 700 to 770 by 1990. Given the present density, the 147 acres of vacant privately-owned non-agricultural land in Panaca can accommodate 710 additional residences. With an average of 3.2 people per residence, a population increase of over 2,000--triple the projected increase--could be supported. This estimate includes a 31 percent allowance for roads and does not consider 71 acres of agricultural land within the township as vacant land. Residential expansion and associated commercial and public purpose expansion could be satisfied on available private land.

Pioche: Pioche has 640 residents within the town limits of 182.6 acres, which establishes an overall population density of 3.5 people per acre. However, the residential lots comprise only 34 acres, consequently the net density is 18.8 people per acre or 6.5 residences per acre.

The mines at Pioche have hired approximately 100 persons since January 1973, and indications are that more mines in the Pioche area may be opened. Consequently, the Lincoln County Master Plan estimates a population of between 827 and 1,425 persons by 1990 for Pioche township. The projection of 827 persons assumes a moderate increase in mining and mineral processing activities and the projection of 1,425 persons assumes a substantial increase. Although the County Commissioners have shown interest in acquiring public land around Pioche for residential expansion, the master plan offers the following analysis:

> There are presently some 222 residences in Pioche which occupy 34 acres or about 19 percent of the land area. Of the 182.6 acres of land surveyed in the land use inventory, 72.1 are vacant. At the present density of 6.5 dwelling units per acre and if the percentage of land used for roads remains the same, an additional 344 residences could be built. This would accommodate about 1,000 persons and should be adequate for the period of the master plan. From the standpoint of government economy, it would be difficult to justify large scale residential developments adjacent to Pioche until the available land within the community has been utilized.

Even a moderate increase in population would tend to require the available vacant land for residential and commercial purposes. Therefore, the community will look to public land to accommodate public projects.

Ash Springs: Ash Springs, a settlement of 30 permanent residents, encompasses approximately 37 acres. The majority of the residents live in mobile homes. The residential lots that are occupied total 2.6 acres for a net population density of 11.5 people per acre. Since 19 acres in Ash Springs are vacant, the community can accommodate an increase of 280 people without changing the net density. This increase is substantially higher than the expected growth at Ash Springs; therefore public land is not considered necessary for urban-surburban expansion during the planning period.

Tempiute Village (Sand Springs Valley): This community contains 7,242 acres of private land patented exclusively under the Desert Land Entry Agricultural Act. The current population (1978) of Sand Springs Valley is approximately 100 people. The community is called Tempiute Village. The majority of these residents live in mobile homes or truck campers and work at the nearby Tempiute Mine. There is a vast amount of private land in the valley available for development purposes and, therefore, a demand for public land for expansion purposes would be unfounded. However, a demand for public land to be utilized for recreation and public purposes can be expected.

Public Purposes: The overwhelming quantity of public land in the planning unit creates situations that elude rigid analysis, but still bear heavily on proper planning. One concern of the planning unit residents is the land area subject to property tax. Their basic goal is to maximize this acreage. Since the acquisition of public land by individuals is difficult, the primary means of maximizing the taxable property base is to utilize public land for all public projects to avoid reducing the acreage of privately-owned land. Public purpose projects are normally exempt from property taxes; therefore, it would not serve the County's purposes to allow private land to be dedicated to any use that can be accommodated by the Recreation and Public Purpose Act on public land. This is especially true since public land is readily available for public projects.

Consequently, demand for land for public purposes has been almost constant. Although this demand will be influenced by population increases in the planning unit, it is not necessarily a direct relationship. For instance, the number of sanitary landfill sites could conceivably decrease since growth could make it economically feasible to operate one or two regional sites rather than four or five local dumps.

Some existing schools have unused capacity that can absorb a certain increment of growth without any change in the size or number

of school sites. However, an increase beyond the unused capacity may only generate a school addition rather than an entirely new school since the expense would probably not be justified by the moderate growth projected for the planning unit.

Public lands will most likely be in greatest demand for recreational developments adjacent to the communities.

Agriculture: The amount of land in farms in Lincoln County increased from 38,817 acres in 1969 to 58,320 acres in 1974. If this trend continues to 1990 there will be a total demand for 120,729 acres, an increase of 62,409 acres. Prorated to reflect that 61 percent of the county is in the planning unit, it can be estimated that 38,069 acres will be demanded in the planning unit. However, the increase from 1969 to 1974 was dependent to a large extent on increased use of irrigation water. The State Water Plan for agriculture predicted that Lincoln County will have a groundwater deficit as early as 1980. Surface waters have been almost entirely appropriated. Therefore, the future demands for agricultural lands in the planning unit may be quite limited. A recent study by BRI systems indicates that as few as 1,800 acres of public lands in the planning unit are suitable for agricultural use.

Recent interest in the Carey Act, a little-used federal law passed in 1894 to provide for the transfer of public agricultural lands to the western states, has created a new source of demand for public lands in the planning unit. As of February 14, 1978, the Nevada Division of State Lands had received applications for 69,040 acres of public land in the planning unit. This demand has been greatly influenced by land speculation and by private land filing services; it is not based on full knowledge of Carey Act requirements or of the suitability of the land applied for.

In conclusion the demand for agricultural use of public lands in the planning unit may be as high as 69,040 acres, but is probably closer to the 1,800 acres determined suitable.

.22 Minerals

The purpose of this analysis is to point out the present role of BLM in the management of minerals activities on public lands in the Caliente Planning Unit, and how it affects people who live within the unit, as well as people statewide and nationally. It will also attempt to estimate the impacts of changes that these activities will bring about in land use management and identify needs and desires of the public (local, state, and nation wide) related to minerals activities. In general this section will evaluate the economic and sociological relationship of minerals activities, present and potential, to the community.

A. Market Areas

Locatable minerals produced within the Caliente Planning Unit are usually exported out of the area as concentrate. Tungsten and zinc are exported from Tempiute to Bishop, California, where they are further refined before entering into national markets. Silver, lead, and zinc are shipped from Pioche to Kellog, Idaho, for further refining where they also enter into national markets. Iron and sulphur from Pioche are shipped to agri-chemical firms in California for use in that state. Perlite from the South Pahroc Range is exported to Southern California where it is used in the construction industry. Lime from a mine near Pioche which will open in April 1978 will be shipped to the Battle Mountain area of Nevada and to Utah. Sand and gravel, the only salable minerals produced in the planning unit, are used within the planning unit.

B. Mineral Commodities, Production, and Reserves

Leasable Minerals: There are no leasable minerals currently being produced in the planning unit. However, there has been considerable interest in oil and gas leases. Approximately 900,000 acres throughout the planning unit have been applied for. Other leasable minerals believed to exist in the planning unit are alunite (containing potassium) and low grade phosphate rock. The value and extent of these potential reserves will not be known until further exploration is done.

Locatable Minerals: There are four operations actively engaged in production of locatable minerals at present. Another operation is expected to begin production in April 1978. The tungsten-zinc mine at Tempiute is operating at a production rate of 1,000 tons per day. The silver-lead-zinc mine at Pioche is producing about 1,500 tons of ore per day.[1/] The iron-sulphur operation at Pioche is processing 120 tons of old mine tailings

1/ This operation shut down temporarily starting in March 1978.

per day into those minerals. Perlite production from the South Pahroc Range is seven tons per day. Approximately 125 tons of lime per day will be produced by an operation near Pioche starting in April 1978. Table PAA-3 shows historic production of metals in Lincoln.

Estimated reserves at Tempiute are 8 million tons, enough for a 20-year production period. Silver, lead, and zinc reserves have not been determined, but BLM estimates indicate that the mine at Pioche has enough raw material for at least a six-year production period. There is at least a 20-year supply of mine tailings for the iron-sulphur operation. The South Pahroc Range has 15 million tons of perlite. Total perlite reserves in the planning unit are estimated to be 136 million tons. Drill tests indicate that a 15-year supply of lime is available at Pioche.

At least five mining firms are attempting to develop workable reserves in the planning unit. Gulf Resources and Chemical Company, Gulf Mineral Resources Company, and Kerr-McGee are drilling and actively exploring for silver, lead, and zinc in the Pioche area. Newmont Exploration and Phelps Dodge are actively exploring in the Delamar Mountains for gold.

Salable Minerals: An estimated 23,000 cubic yards of sand and gravel were utilized by private users in 1977. BLM sales in the Alamo-Tempiute area accounted for 80% of this total. Public users, primarily the Nevada State Highway Department and the Lincoln County Road Department utilized significant quantities of sand and gravel in road construction and maintenance. No estimate of their total usage is available. There are vast reserves of sand and gravel found throughout the planning unit. Reserves of building stone may exist in the area, but the value and extent of the deposits is not known.

C. Income-Employment

The principal present and future value of minerals in the planning unit lies in the locatable minerals. Table PAA-4 contains detailed information on mine income and employment. Union Carbide's tungsten-zinc mine at Tempiute will probably be the most significant producer of mineral income and employment through 1990. The silver-lead-zinc mine at Pioche will most likely remain a close second throughout this period. Other mines provide a small share of income and employment but they do help provide for a broader and more stable mining industry. The opening of lime production at Pioche in early 1978 should provide further much needed stability. This mining and milling will have about 17 employees[1/] with an estimated income of $277,780.[2/]

1/ Maurice Sonik, Manager, Sierra Chemical Corporation.
2/ Estimate calculated by BLM, Las Vegas, 1978.

Table PAA-3

CALIENTE PLANNING UNIT
Value of Production from the Principal Mining Districts,[1] Lincoln County
(e, estimate)

Rank	District	Principal Commodities	Value of Mineral Production Prior to 1908	1908 to 1958	Total Value
1	Pioche	Zinc, silver, lead, manganese	$21,343,600	$111,672,800[2]	$133,016,400
2	Bristol and Jackrabbit	Silver, lead, copper, zinc	4,800,000e	12,409,300e	17,209,300
3	Delamar	Gold	12,703,500	2,280,200	14,983,700
4	Tempiute	Tungsten	11,400	14,910,600	14,922,000
5	Highland	Lead, silver, gold	1,500,000e	500,000e	2,000,000[3]
6	Groom	Lead, silver	---	1,083,200	1,083,200
7	Pahranagat	Manganese, silver, lead	123,700e	677,700	801,400
8	Comet	Lead, silver, zinc, manganese	4,900	759,200	764,100
9	Eagle Valley	Gold, silver	284,500e	138,500e	423,000
10	Viola	Fluorspar, silver, lead	5,500e	385,200e	390,200
11	Atlanta[4]	Gold, silver	75,000e	195,300e	270,300
12	Chief	Gold, silver	25,000e	68,700e	93,700
13	Patterson	Tungsten, silver	---	75,000e	75,000
14	Pennsylvania	Gold, copper	---	50,000e	50,000[5]
15	Freiberg	Silver, lead, tungsten	---	18,000e	18,000
16	Ely Springs	Silver	---	8,400	8,400
TOTAL					$184,058,700

1/ Most of these districts are within the Caliente Planning Unit.
2/ Includes Bristol District, 1908-1915.
3/ Included with Pioche District.
4/ Includes Silver Park District.
5/ Included with Viola District.

Source:
Nevada Bureau of Mines and Geology, Geology and Mineral Deposits of Lincoln County, 1970.

Table PAA-4

CALIENTE PLANNING UNIT
Economic Significance of Mineral Production 1/
in the Caliente Planning Unit
1977

Industry and Commodity	Employment		Income	
	Number	Percent 2/ of County	Dollars 3/	Percent 4/ of County
Locatable				
a. Tungsten-Zinc	185 5/	14.6	2,405,000	16.5
b. Silver-Lead-Zinc	110 6/	8.9	1,797,400	12.3
c. Iron-Sulphur	6 7/	0.5	98,040	0.7
d. Perlite	2 8/	0.2	24,692	0.2
Leasable	0	0	0	0
Salable				
a. Sand and Gravel	3 9/	0.2	37,038	0.3
Total 10/	306	24.1	4,362,413	29.9

Note:
1/ These figures are based on total employment and income of firms involved in mining. They include mining, milling, and hauling operations.
2/ Total County Employment Nov. 77 = 1270; Nevada NESD, 1977.
3/ Income figures are estimates calculated by BLM, Las Vegas, 1978, except tungsten-zinc from "Environmental Assessment: Tungsten Mining and Milling Operations, Tempiute, Lincoln County, Nevada", Union Carbide, Sept. 1976, (adjusted).
4/ Total County Income = 14,606,250; Estimate calculated by BLM, Las Vegas, 1978.
5/ Jerry Yopps, Union Carbide, 1978.
6/ William Lampart, Bunker Hill Mining, 1978.
7/ R. J. Dalton Company, 1978.
8/ Wilkins Mining and Trucking, 1978.
9/ Nevada Job Service, Ely, Nevada, 1978.
10/ Totals subject to rounding errors.

The exploration for silver, lead, and zinc near Pioche and for gold in the Delamar Mountains may lead to additional income and employment from locatable minerals.

Leasable minerals may have a future in the planning unit. The recent interest in oil and gas leasing will probably lead to increased exploration work. A typical seismic exploration job takes about 45 days and employs 25-30 workers. The wages are low but the working days are long and living expenses are provided. If oil and gas fields are developed only a small increase in local income and employment can be expected because this type of mining is highly capital intensive.

D. Population Effect

Based on a population/employment ratio of 2.83, approximately 865 people are dependent on mining in the planning unit. This represents about 25 percent of the total county population. Most of these people are dependent on the Tempiute mine which reopened in 1977. The town of Alamo has experienced the greatest impact from population growth as a result of the opening of this mine. Union Carbide estimates that about 250 people have established residency in Alamo in the last year.

E. Other Indicators of Significance

A list of royalty recipients and net proceeds of mines is contained in Table PAA-5.

Table PAA-6, Gross Yield of Mines, illustrates the unstable nature of mining in Lincoln County. Gross yields fluctuated from a low of $19,000 in 1963 and 1964 to a high of $7,495,000 in 1975.

Mining property was assessed at $3,529,151[1/] in fiscal year 1977. This represents 15 percent of the total property tax base for Lincoln County and is an increase of 187 percent over 1975.

F. Mineral Demand Projections

Table PAA-7 summarizes 1990 demand projections for minerals currently produced in the planning unit.

Tungsten-zinc: Union Carbide's planned full production capacity by 1990 is 1,310 tons per day. This will be an increase of 310 tons per day over 1977 levels.

1/ Lincoln County Record, 12/12/77.

Table PAA-5

CALIENTE PLANNING UNIT
Net Proceeds of Mines Taxation

First Period 1977, October 3, 1977

Lincoln County

Operators

Milt Holt	$ 3,789.00
The Standard Slag Company	68,210.00
Total	$71,999.00

Royalty Recipients

Combined Metals Reduction Company	$ 1,580.00
Comet Coalition Mines Company	30,432.00
The Standard Magnesia Company	51,506.00
Total	$83,518.00

Table PAA-6

CALIENTE PLANNING UNIT
Gross Yield of Mines
Lincoln County

Year	Gross Yield	Year	Gross Yield
1955	$4,453,000	1967	$1,025,000
1956	$4,931,000	1968	$ 118,000
1957	$2,822,000	1969	$ 728,000
1958	$1,059,000	1970	$ 212,000
1959	$ 894,000	1971	$ 210,000
1960	$ 548,000	1972	$ 171,000
1961	$ 427,000	1973	$ 80,000
1962	$ 206,000	1974	$ 165,000
1963	$ 19,000	1975	$7,495,000
1964	$ 19,000	1976	$1,973,000
1965	$ 51,000	1977[1/]	$1,626,672
1966	$ 930,000		

1/ First six months.

Table PAA-7

CALIENTE PLANNING UNIT
Mineral Demand Projections in the
Caliente Planning Unit

Mineral	1977 Production	1990 Demand	Percent Change
Tungsten-Zinc	1,000 tons/day	1,310 tons/day	+31%
Silver-Lead-Zinc	1,500 tons/day	2,120 tons/day	+41%
Iron-Sulphur	120 tons/day	120 tons/day	0%
Perlite	7 tons/day	11+ tons/day	+57%
Lime	125 tons/day	175 tons/day	+40%
Sand and Gravel			
Total Private	23,000 cu. yds/yr	7,500 cu. yds/yr	-67%
BLM sales	19,000 cu. yds/yr	6,000 cu. yds/yr	-67%

Silver-lead-zinc: The demand for this ore is dependant on the demands for each individual mineral because they all contribute significantly to revenues of the firm producing them. The U.S. Bureau of Mines expects the demand for zinc to increase 2.6% per year; the demand for silver to increase 2% per year; and the demand for lead to increase 1.5% per year. A weighted average of these demands based on the percent of market value that each mineral contributes[1/] produces an increase of 2.26% per year demand for silver-lead-zinc ore. The planning unit will have to provide 2,006 tons per day in 1990 to maintain its 1977 share of production. However, significant downward fluctuation in the prices of any of the co-products may cause temporary shut downs in the mining operation. The mine shut down in March 1978 was due to the decline in the price of zinc from 37 cents per pound in 1976 to 29 cents per pound in 1978. Silver is even more susceptible to price fluctuations because of its inelastic supply and demand characteristics. Small changes in either the supply or demand of silver cause large change in its price. Further instability is caused by volatile speculative interests. The price of lead has been relatively stable, but the long term effects of the declining use of lead as an additive to gasoline have not been felt yet.

Iron-sulphur: The production of these minerals in the planning unit has been very stable in the past. Mining officials predict that it will continue to be stable in the future. Therefore, the demand for the mine tailings used to produce these minerals is expected to remain at the current level of 120 tons per day.

Perlite: The U. S. Bureau of Mines expects the demand for perlite to increase by 3.6 percent per year. The Caliente Planning Unit will have to provide 11 tons per day in 1990 to maintain its current share of production. Perlite is mainly used in construction. The demand for it is highly dependent on it's distance from construction activity. The expected rapid growth of the Southwest should increase the planning unit's share of production, so the projected future demand of 11 tons per day should be considered a minimum level.

Lime: The U. S. Bureau of Mines expects the demand for lime to increase by 2.6 percent per year. The Caliente Planning Unit will have to provide 175 tons per day in 1990 to maintain its expected 1978 share of production. The future demand for lime will depend on three characteristics: 1) It is very usefull in pollution control equipment. 2) The demand for it is highly dependent on distance from the market. 3) Lime production is one of man's most energy intensive industries. The increasing use of pollution control equipment and the expected growth of the Southwest should increase the demand for lime in the planning unit. However, rising fuel prices will hasten the search for alternatives.

1/ Zinc produces 57%, silver 29%, and lead 14% (estimates calculated by BLM, Las Vegas)

Sand and Gravel: The demand for sand and gravel by private users is closely related to the population growth rate in the planning unit. Periods of rapid population growth are characterized by a very active construction industry--which is the primary user of sand and gravel. There was a very high population growth rate in 1977, which resulted in a very high demand for sand and gravel--23,000 cubic yards. Since population growth is expected to be slower in 1990, the demand for sand and gravel is expected to decline. Based on a projected Lincoln County population of 5,018 in 1990, and a national average use of about 1.5 cubic yards per person,[1/] the demand for sand and gravel for private users will be 7,500 cubic yards per year. Since over 90 percent of the population of Lincoln County is in the Caliente Planning Unit most of the demand for sand and gravel will be in the planning unit. BLM sales will have to be about 6,000 cubic yards to maintain its present share of production. The demand for sand and gravel by public agencies is expected to increase, mainly because of the anticipated improvements on the Kane Springs road. No estimate of the number of cubic yards is available.

Leasable Minerals: There is no way to accurately estimate the future demand for energy resources in the planning unit. However it should be noted that the development of additional domestic energy resources is a primary national goal. The United States' reliance on important energy sources has caused large balance of payment deficits. Any development of energy resources in the planning unit will help to reduce these deficits.

G. Mineral Deposit Discovery Potential

Table PAA-8, giving some estimates of the likelihood of deposit discovery, has been compiled from general geological reconnaissance and literature research by the Nevada Bureau of Mines and Geology. The principal risk in this sort of forecast is that the finding of an isolated occurrence of a mineral can be extrapolated into a significant potential, whereas, in reality, all that exist are a few scattered occurrences of the particular mineral that may never form the basis for a commercial operation. On the other hand, what is significant is a finding of small amounts of a mineral, or combination of minerals (such as a low grade copper dissimination with minute amounts of molybdenum, gold, and silver), that can be mined in open pit operations on a large scale at such time in the future that the economics are favorable. The one occurrence is of no value while the second example would provide employment for hundreds of people. Distinguishing between these two types of mineral occurrences requires further study and testing.

1/ U. S. Bureau of Mines Commodity Data Summaries, 1976.

Table PAA-8

CALIENTE PLANNING UNIT
Mineral Deposit Potential

	High	Moderate	Low
Antimony			NE¼, NW¼, SE¼, SW¼
Beryllium			All
Copper	NE¼, SE¼	NW¼, SW¼	
Gold & Silver	NW¼, NE¼	SW¼, SE¼	
Iron	NE¼		NW¼, SW¼, SE¼
Lead & Zinc	NE¼, SW¼	NW¼, SE¼	
Manganese	NW¼, NE¼	SE¼	SW¼
Mercury		NW¼, SE¼	NW¼, SW¼
Molybdenum		NW¼, SE¼	NE¼, SW¼
Tungsten	NW¼, NE¼		SW¼, SE¼
Uranium	NW¼, NE¼		SW¼, SE¼
Vandium		NE¼	NW¼, SW¼, SE¼
Barite		SE¼	NW¼, NE¼, SW¼
Clays		All	
Diatomite	NE¼		NW¼, SW¼, SE¼
Fluorspar	NW¼, SE¼		NE¼, SW¼
Refractories			ALL
Industrial Sand	NE¼, SW¼		NW¼, SW¼
Sand & Gravel	NE¼		NW¼, SW¼, SE¼
Stone	NE¼, SE¼		NW¼, SW¼
Vermiculite	SE¼		NW¼, NE¼, SW¼
Zeolites			All
Geothermal	NW¼, NE¼		SW¼, SE¼
Petroleum			All
Phosphate		SE¼	

Source:
Nevada Bureau of Mines and Geology, "Analysis for Lincoln County, Nevada", Forecasts for the Future - Minerals, 1972.

.23 Woodland Products

A. Analysis

Woodland production within the Caliente Planning Unit originates almost entirely on public lands. No exact figure is available for the ratio of production from public land to the production from lands under all other types of ownership but a BLM estimate is that 95 percent of the total production in the planning unit originates on public lands. As is pointed out in the Unit Resource Analysis, no timber products come from the planning unit, however, products include cordwood, Christmas trees, fence posts, and pine nuts and boughs. On a regional basis (Lincoln, Clark, and eastern Nye counties in Nevada; the western portions of Washington, Iron, and Beaver counties in Utah), the Caliente Planning Unit's public lands are estimated to account for about 30 percent of total production.

Table PAA-9 illustrates the woodland produce harvest in the planning unit for selected years.

B. Income

While public land contribution to woodland production in the planning unit is estimated to 95 percent, in terms of total income in Lincoln County, woodland production contributes a minute share. In fiscal year 1977, 40 cords of firewood constituted the entire commercial harvest of woodland products by county residents. Cords of firewood sold for about $60.00,[1/] the market price of the 40 cords was about $2,400. The income derived from this was probably less than $2,000.

It should be noted that the production of woodland products in the Caliente Planning Unit still remains an important activity that results in lowering the dollars flowing out of the area for fuel, fence posts, pine nuts, and Christmas trees. These are harvested on a noncommercial basis by many residents.

The retail price of juniper fence posts in 1977 was about $2.00 per post.[2/] The 3,330 fence posts harvested in the planning unit could have sold for $6,660. The retail price of pinyon Christmas trees in Las Vegas was about $15 each.[3/] The 6,033 trees harvested in the planning unit could have sold for $90,495 in Las Vegas. The 664 cords of firwood harvested in the planning unit could have sold for $39,840 at $60.00 a cord.[1/] The 600 pounds of pine nuts collected could have sold for $1,200 at $2.00 a pound.[4/] The total retail price for all woodland products harvested in the planning unit in 1977 could have been $138,195.

1/ BLM estimate
2/ Orrs Builders Supply, Ely, Nevada
3/ Jack Fisher, Nevada Division of Forestry
4/ Jacob Lake Inn, Jacob Lake, Arizona

Table PAA-9

CALIENTE PLANNING UNIT
Summary of Woodland Produce Harvest
Within the Caliente Planning Unit
(For Selected Years)

Fiscal Year		Fence Posts	Pine Nuts/lbs	Firewood (Cords)	Christmas Trees	Boughs lbs.	BLM Receipts
1969	Total	4789	20,200	222	245	0	0
	Free Use	4789	20,200	222	245	0	0
1970	Total	5990	200	194	1118	0	$ 353.00
	Free Use	3790	0	180	1118	0	
1971	Total	7433	0	196	1714	0	$ 942.00
	Free Use	5683	0	196	1034	0	
1972	Total	6211	0	203	3886	0	$2224.00
	Free Use	4945	0	188	1866	0	
1976	Total	5030	250	762	6342	0	$8793.00
	Free Use	500	0	25	0	0	
1977	Total	3330	600	664	6033	68	$8071.00
	Free Use	0	0	25	0	0	
1978*	Total	895	0	883	8411	70	$10,366.00
	Free Use	0	0	29	209	0	

(*Partial: to 1/31/78)

Source:
BLM Records

C. Demand Projections

Based on past trends (see Table PAA-9), which will probably continue in the future due to expected increase in fuel prices and regional population, the demand for planning unit firewood is expected to increase 170 percent to 1800 cords by 1990 and the demand for planning unit Christmas trees is expected to increase 110 percent to 17,800 trees by 1990. The demands for other woodland products are expected to remain at or near current levels.

.24 Range Management

A. Analysis

Public lands furnish approximately 81 percent of the total forage consumed by domestic livestock in the Caliente Planning Unit. Since sheep account for less than one percent of the grazing on public land, all livestock are grouped under one heading in this analysis. Approximately half the allotments within the planning area are grazed yearlong, although a requirement in land-base grazing units are 1.2 months on base property. Some operators have grazing privileges on both summer and winter areas, and thus their livestock are never off public land.

Water-base units are classified for yearlong use although some operators do no graze livestock on the allotments yearlong. On the allotments grazed yearlong, forage trend in downward, because forage plantsare not able to produce seed and store nutrients for growth. Some important forage species have almost disappeared from areas grazed yearlong, due to extreme use by livestock.

Plants are more palatable during the first part of the growing season, which is the time the most grazing pressure is exerted. Only in areas where an Allotment Management Plan is in effect, are forage plants allowed rest during the critical part of the growing season.

B. Significance

Significance will be measured in terms of Annimal Unit Months (AUMs). They are a measure of the forage required to feed one animal unit for one month. An animal unit is equivalent to one cow over six months of age or five sheep over six months of age. Table PAA-10 shows the contribution of public land forage to total forage in Lincoln County and the Caliente Planning Unit.

The livestock industry is dependent on public lands to supply 81 percent of the total forage consumed. While a total of 79,612 public land AUMs were used in the planning unit, only 33,060 (42%) were used by ranchers based in Lincoln County. The remainder were based primarily in Clark County, Nevada, and in Southwestern Utah. The AUMs based in Lincoln County (i.e. that contribute to income in the county) account for 63 percent of the forage used by Lincoln County based ranchers. The percentage of public land AUMs based in Lincoln County may vary significantly from year to year due to the high turnover of grazing allotments. This high turnover rate is caused primarily by unstable economic conditions.

Table PAA-10

CALIENTE PLANNING UNIT
Range Livestock Significance, Income, and Employment
1977

	County	Planning Unit
AUMs Used		
Total[1/]	179,690	98,286
Public Land [2/]	146,108	79,612
% dependant on public land	81%	81%
AUMs Based in Lincoln County		
Total[1/]	132,946	52,476
Public Land[2/]	83,701	33,060
% dependent on public land	63%	63%
Income[3/]		
Total	$316,712	$124,892
Public Land	$199,208	$ 78,683
% of county income dependent on public land[4/]	1.51%	0.60%
Employment[5/]		
Total	69	38
Public Land	56	31
% of county employment dependent on public land[6/]	5.3%	2.9%

Notes:

1/ Lincoln County Tax Records, 1977.

2/ BLM grazing license billing records, 1978.

3/ From income/AUM ratio (2.38) calculated by BLM, Las Vegas from; BEA, 1970-1975; U. S. Bureau of the Census, 1969, 1974; Lincoln County Tax Records, 1977; NESD, 1977.

4/ County income 1970-1977 average (1977 dollars) - 13,198,430 calculated by BLM, Las Vegas from; NESD 1970-1977, BEA 1970-1975.

5/ From AUM/employee ratio (2604) calculated by BLM, Las Vegas from; U. S. Bureau of the Census, 1969, 1974, NESD 1970-1977.

6/ County Employment 1970-1977 average - 1055; NESD 1970-1977.

C. Income-Employment

Table PAA-10 shows public land significance in contribution to direct livestock income and employment in the county. Public land forage in the planning unit accounts for $78,683 (0.60%) of the total county income and provides employment for 31 workers (2.9% of total employment). The income percentage is highly dependent on fluctuations in the price of beef cattle. It changed 87percent from 0.71 percent in 1973 to 0.09 percent in 1975. This trend is not evident in range livestock employment which has been relatively stable in recent years.

The overall significance of livestock grazing on public lands in the planning unit is greater than these figures indicate because it adds some much needed stability to the county economy. Lincoln County is highly reliant on mining for its economic base.1/ Fluctuations in this industry have caused the county economy to be highly unstable. Any additional basic economic activity, such as livestock grazing, will tend to add some stability to the economy.

Public land forage in the planning unit contributes an additional $110,794 of income to ranchers in the Southern Nevada and Southern Utah regions that are not based in Lincoln County. This accounts for less than 0.01 percent of total regional income.

D. Operator Analysis

There is a lack of specific economic information on the ranchers in the planning unit. However, an analysis of Southern Nevada cattle ranching in 1972 was recently published. Although it does not give an exact description of ranching in the planning unit in 1977, it can be used as a general indication of the type of ranching occurring in the planning unit. The estimates in Table X indicate that the average small ranch (less than 350 animals) in Southern Nevada lost about $3,000 a year. Medium sized ranches (between 350 and 800 animals) earned about $4,000 per year, and large ranches (over 800 animals) earned $91,000 a year. Income per animal unit increased sharply as ranch size increased. This probably accounts for the trend toward larger ranching operations in the area.

Table X also indicates that per unit costs decline as ranch size increases. This is partly due to the fact that larger ranches are generally more efficient than smaller ranches. But it

1/ A region's economic base consists of those industries that bring in dollars from outside the region. The growth or decline of a region's economy is dependent on these industries.

may also be due to the fact that large ranches in the study that data in Table X were derived from, depended on federal forage for a much higher proportion of their total feed requirements than the other ranchers--an indication that feeding cattle with federal forage is less costly than other methods.

Table X
Average Income Measures for Southern Nevada Ranches
1972

	Size of Ranch		
	Small	Medium	Large[2/]
Receipts	$12,417	$40,466	$248,490
Per Animal Unit	$74	$74	$74
Expenses	$15,276	$36,678	$157,139
Per Animal Unit	$90	$67	$60
Income[1/]	-$ 2,859	$ 3,778	$ 91,351
Per Animal Unit	-$17	$ 7	$35

1/ Does not include returns to operators labor and management.
2/ Normalized returns.

Source:
Garrett and Mitchell, 1978.

Table Y contains the value of assets for ranchers in Southern Nevada. Land was the largest asset for all sizes of ranches. The value of a rancher's assets is the major factor in determining his ability to obtain borrowed capital. Most ranchers include the value of their federal grazing privileges in their land asset value. Changes in the level of federal grazing use allowed will change the value of a rancher's assets, which will, in turn change his ability to borrow capital. For those rancher who are highly dependent on borrowed capital, this ability may be the most critical part of their ranching operation.

Table Y
Average Asset Values for Southern Nevada Cattle Ranches
1972

	Size of Ranch		
	Small	Medium	Large
Assets			
Buildings and Equipment	$ 19,857	$ 67,425	$ 88,800
Land	$110,375	$267,426[1/]	$1,234,950
Livestock	$ 46,976	$148,206	$ 731,091
Total	$176,208	$483,057	$2,054,841
Per Animal Unit	$1,045	$886	$787

1/ Due to lack of data, land assets for medium ranches were derived by averaging large and small ranches.

Source:
Garrett and Mitchell, 1978.

Labor costs and depreciation charges were important expense items for all sizes of ranches (Table Z). Small and medium ranches also had high fuel costs. Medium and large ranches had significant livestock purchases. Federal grazing fees were the largest expense for large ranches.

Table Z
Average 1972 Operating Expenses for Southern Nevada Ranches

Expense Item	Size of Ranch: Small Amount	Small Percent	Medium Amount	Medium Percent	Large Amount	Large Percent
Labor	$ 2,250	14.7	$ 4,975	10.8	$ 19,852	12.6
Livestock Purchases	999	6.5	5,275	15.8	26,475	16.8
Repairs & Maintenance	1,400	9.2	2,950	8.6	7,625	4.9
Depreciation	2,010	13.2	5,440	15.0	24,091	15.3
Interest	482	3.1	1,155	3.1	4,946	3.1
Gas & Lubricants	1,683	11.0	3,600	10.3	10,300	6.6
Feed Purchases	718	4.7	2,453	6.9	2,083	1.3
Taxes	733	4.8	3,000	8.4	7,925	5.0
Custom Work	0	0.0	16	.1	0	0.0
Insurance	903	5.9	1,485	4.1	8,450	5.4
Federal Grazing Fees	1,195	7.8	2,487	7.6	34,624	22.0
Utilities	1,114	7.3	2,300	5.0	6,575	4.2
Hay & Crop Expenses	97	.6	0	0.0	0	0.0
Miscellaneous	1,692	11.1	1,542	4.2	4,220	2.7
Total	$15,276		$36,678		$157,139	

Source:
Garrett and Mitchell, 1978.

In 1977 there were 69 operators with grazing privileges in the planning unit. Seventeen of these operators didn't use any of their privileges. Five of these were sheep ranchers. Their non-use probably reflects the continued decline of the sheep industry. Most of the other ranchers with nonuse had privileges in the northeast section of the planning unit--an area characterized by poor range conditions due to overgrazing by wild horses.

Of the operators who did use public land forage, 43 had small ranches (less than 2,435 public land AUMs), five had medium sized ranches (between 2,435 and 5,568 public land AUMs) and four had large ranches (more than 5,568 public land AUMs).[1/]

Most of these ranches have cow-calf operations. This type of operation produces calves which are marketed during their first year, usually at six to eight months of age. The major source of receipts in cow-calf operations is calf sales.

Very few of the ranchers in the planning unit have controlled breeding programs. Most operators run bulls with their cows year-long which results in calf births occurring year round. This is generally true for the entire Southern Nevada region. It partially accounts for the fact that ranches in the region are characterized by low productivity. The number of calves born per cow is considered low,[2/] as is the weight of weaned calves.[3/] Other important factors influencing productivity are the general lack of pregnancy testing of cows and fertility testing of bulls.

A large proportion of the calves produced in the planning unit are sold by contract[4/] to a buyer from Utah who works on commission for a number of feedlots throughout the West. Contract sales generally occur in the spring and fall. Other cattle and calves are usually sold at an auction in Cedar City, Utah.[5/] Bakersfield

E. Demand Projections

A rough estimate of the 1990 demand for public land forage by ranchers can be obtained by projecting the past trends in cattle numbers[6/] into the future. If these trends continue there will be an increase of 31 percent in the demand for forage in Lincoln County. If the Caliente Planning Unit is to supply the same share of total county forage requirements in 1990 as it did in 1977, 104,292 AUMs will be required.

1/ These size categories are based on the Garrett-Mitchell study.
2/ Calving Percentage is about 60 percent, Garrett & Mitchell, 1978.
3/ Weaning weights are about 360 pounds; Garrett & Mitchell, 1978.
4/ Contract sales refer to those sales of cattle in which the owner agrees to deliver his cattle to the buyer on a specified future date for a predetermined price.
5/ Information provided by Darwin Bradfield, County Extension Agent, Calietne, Nevada.
6/ 1971 to 1977 in Nevada Agricultural Statistics, 1975 and 1976, UNR.

This should be considered only a very rough estimate because the future demand for public land forage will depend on many trends which cannot be accurately predicted. Beef price trends will be an important factor. In the past beef prices have been very unstable. There is no reason to believe that this trend will not continue in the future.

The price of public land AUMs will also be an important factor. The Bureau of Land Management is committed to raising prices to "fair market value". If prices are increased the demand will be less than if they remained the same.

The quality of public land AUMs is another important factor. Some of the available AUMs in the planning unit are not being used (only 79,612 out of a total of 114,260 were used) at present because they are of poor quality. The Federal Land Management Policy Act of 1976 provided funds to be used to rehabilitate, protect, and improve the federal range. If the quality of public land AUMs is increased then the demand for them will be greater.

Another important factor is the risk associated with public land forage. If the BLM does not provide a steady supply of forage ranchers will consider use of public land AUMs risky, therefore, their demand for them will be lower.

Changes in the intensity of use of private agricultural land will affect the demand for public land forage. Cattle numbers in Lincoln County have increased steadily in the 1970's, but the use of public land forage has remained relatively constant. During the same period the use of private agricultural land has increased dramatically. These trends indicate that increased use of private land has been responsible for the increase in cattle numbers and that public land forage is becoming less important as an input to the ranching industry. If these trends continue there may be little or no increase in the demand for public land forage. However, the ability of Lincoln County ranchers to further intensify their use of private land is restricted by the limited quantity of additional water available for irrigation.

Wild, free-roaming horses and burros create an additional demand on forage resources in the planning unit. There were approximately 1,090 of these animals in the area in 1977. This created a demand for 12,840 AUMs. Wild horse and burro populations in the planning unit have been increasing by about ten percent per year.

This means that by 1990 if populations are not managed and climate and forage conditions are similar there could be up to 3,694 animals in the planning unit, creating a demand for 44,328 AUMs.

.26 Wildlife

A. Analysis

Only consumptive uses of wildlife (hunting and fishing) are analyzed in this section. Other social aspects of wildlife are analyzed under "Social Values Analysis". Other recreational uses of wildlife are included in the "General Recreation" category in the Recreation section.

1. Hunting

Mule deer hunting formerly accounted for the largest percent of hunter days in the planning unit. In 1976 a quota system was established that decreased hunter days to about 1,421 (Table PAA-11) or one fifth of their former levels. Quotas are set on an annual basis, therefore, they may vary from year to year.

Records indicate that a majority of the deer wintering on the Tule Desert migrate from the Dixie National Forest in Utah. Therefore, the Tule Desert as well as other crucial areas identified on URA Step 3 are important for the maintenance of deer populations for consumptive use in Lincoln County.

Interest in bighorn sheep as a trophy animal is high, as indicated by the number of applications received for the limited number of tags, even with a change in application regulations and increased tag fees. In 1976, 193 persons applied for the 14 tags issued by the Nevada Department of Fish and Game (NDF&G). The 14 hunters with tags hunted a total of 117 days (Table PAA-11). The rugged, isolated mountains in the planning unit provide habitat for bighorn sheep.

Upland game hunting is fair in the planning unit. Habitat requirements in most areas are present in sufficient amount to maintain populations of rabbits, quail, and dove. Quail and dove are the most important upland game species. They account fo 5,101 and 3,610 hunter days respectively (Table PAA-11). The crucial habitat areas (URA Step 3) involve water sources that support the population in those areas. To maintain present populations, it is important that cover surrounding the water sources be maintained.

Most rabbit hunting seems to be incidental to other types of hunting (quail, dove). Rabbits accounted for 4,060 hunter days in 1976 (Table PAA-11).

Most of the harvest of dove and rabbits is by local hunters. About 75 percent of the quail hunters are from Clark County.

Table PAA-11

CALIENTE PLANNING UNIT
Hunting, 1976

Species	Hunter Days	Species Population	Hunter Days Per Species Population	Total Habitat Acres	Hunter Days Per Acre of Habitat	Public Land Habitat Acres	Percent Public Land Habitat
Mule Deer	1,421[1/]	2,565[4/]	0.55	1,241,522[6/]	.001	1,229,106[6/]	99
Bighorn Sheep	117[2/]	763[5/]	0.14	352,352[6/]	.0003	352,352[6/]	100
Quail	5,101[3/]	55,000[4/]	0.09	250,000[7/]	.020	200,000[7/]	80
Mourning Dove	3,610[3/]	42,233[4/]	0.09	3,456,424[8/]	.001	3,391,168[8/]	98
Rabbit	4,060[3/]	44,004[4/]	0.09	3,456,424[8/]	.001	3,391,168[8/]	98
Total	14,309	144,626	.10	3,456,424	.004	3,391,168	98

Notes:

1/ Hunter days for deer are based on percent of NDF&G management areas 22, 23, and 24 deer population in the planning unit; from "Big Game", NDF&G, 1977.

2/ Hunter days for Bighorn Sheep are total for the Meadow Valley Range and the Mormon Mountains; from "Big Game", NDF&G, 1977.

3/ Hunter days for Quail, Dove, and Rabbit are based on percent of Lincoln County species population in the planning unit; from "Upland Game', NDF&G, 1977.

4/ Species population for mule deer, quail, dove, and rabbit from "Wildlife Population", NDF&G, 1976.

5/ Species population for Bighorn Sheep from Caliente URA data.

6/ Habitat acres for Mule Deer and Bighorn Sheep from URA data.

7/ Habitat acres for quail based on rough estimates of acres from URA overlays.

8/ Habitat acres for dove and rabbit are the total planning unit area because they are found throughout the planning unit.

2. Fishing

The Caliente Planning Unit provides for an average of about 8,333 angler days per year (Table PAA-12). Fisheries habitat within the planning unit consists of small creeks, reservoirs, and lakes. The creeks are small and have high agricultural demands. Vegetation along the creeks is heavily utilized by livestock and wild horses. This vegetation is important to fish for cover, water temperature, and food production. Management of these waters for fisheries in the future will depend on livestock management systems and creek improvement projects.

With the predicted increase in regional populations, especially in the Las Vegas Valley, and increased stocking efforts on the part of the Nevada Department of Fish and Game, the number of anglers and angler days should increase in the planning unit.

B. Income-Employment

Each major species contributes to income and employment in the planning unit. Table PAA-13 outlines these factors and determines the economic contribution of public land for each consumptive use of wildlife. Hunting and fishing primarily affect the trade (bait shops, grocery stores, etc.) and service (motels, restaurants, etc.) sectors of the economy. Overall, hunting and fishing on public lands in the planning unit account for a total income of $56,470 and employment of eight persons. These figures are less than one percent of total county income and employment, respectively.

C. Demand Projections

The demand for wildlife resources is significantly influenced by regional population levels. The regional population (including Lincoln and Clark counties) has a projected growth of 46 percent from 1976 to 1990.[1/] If the demand for consumptive uses of wildlife resources grows at this same rate and public lands in the planning unit are to provide the same share of wildlife resources in the future as they do now, similar increases in habitat area or species population will be required.

It should be noted that the quota levels for bighorn sheep and mule deer artificially restrict their demand estimates. Projections from artificially restricted estimates will also be restricted.

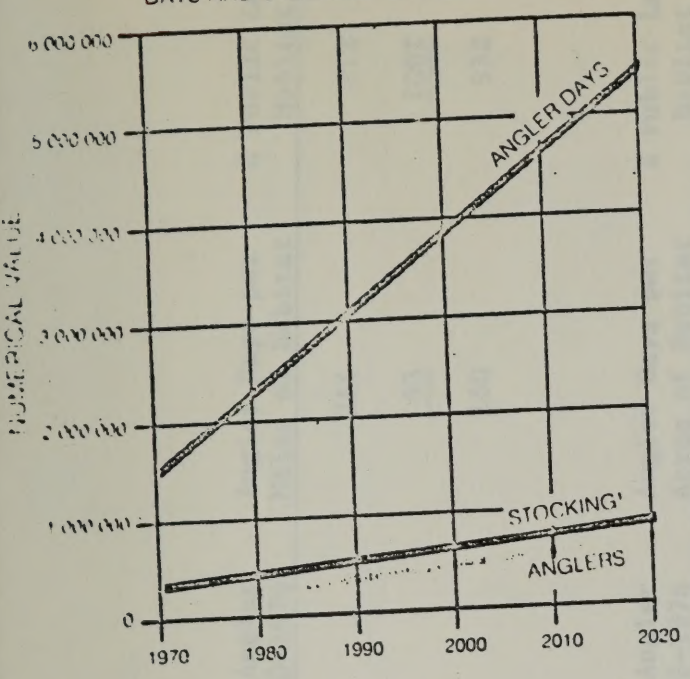
Statewide trends are reflected in the following graphs from Water for Nevada, Volume 6, Nevada State Engineers Office, (NSO), 1970.

1/ Population projections from Lincoln County Social Economic Profile.

GRAPH 1:

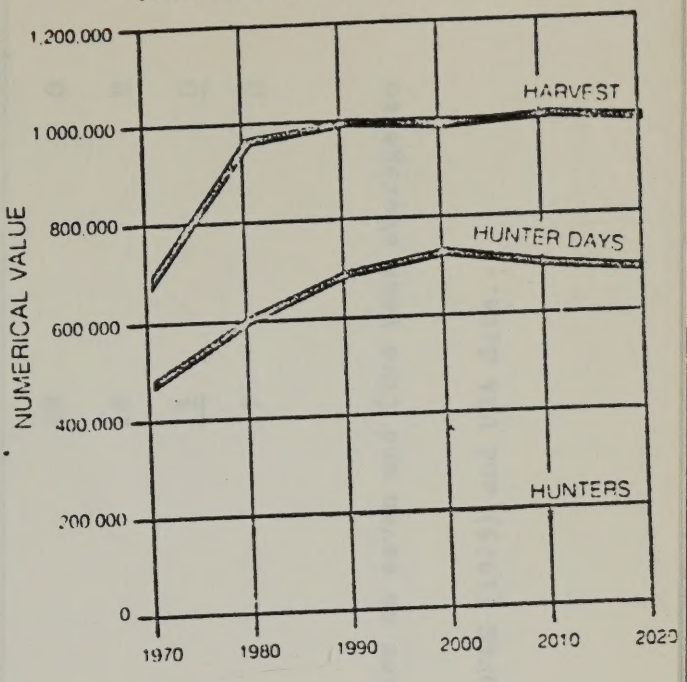
ALL FISH DATA PROJECTIONS

RESIDENT AND NONRESIDENT ANGLERS, ANGLER DAYS AND STOCKING, STATEWIDE, 1970-2020



ALL GAME DATA PROJECTIONS

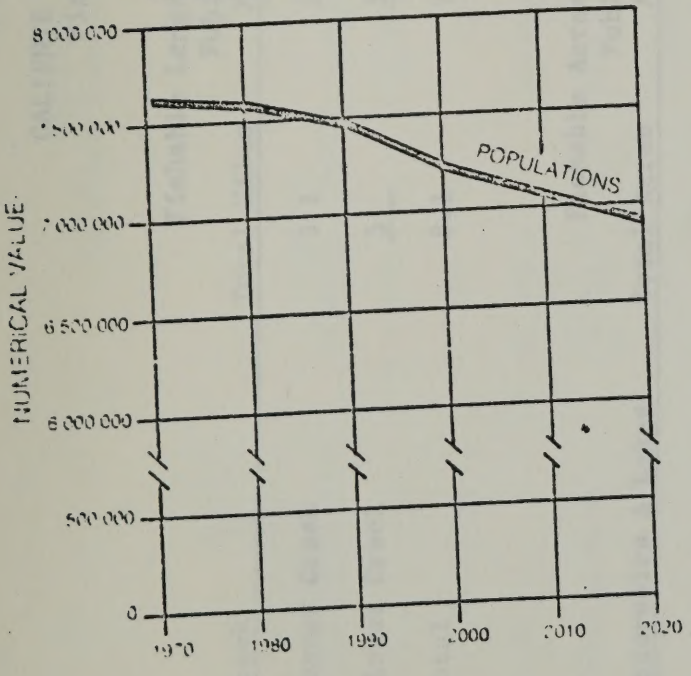
RESIDENT AND NONRESIDENT HUNTERS HUNTER DAYS AND HARVEST, STATEWIDE, 1970-2020



GRAPH 3:

ALL GAME DATA PROJECTIONS

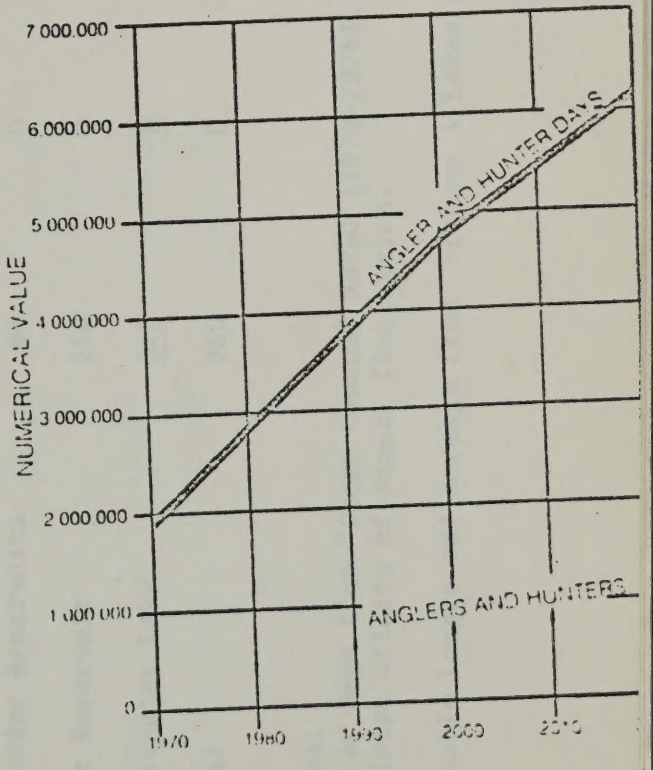
POPULATIONS, STATEWIDE, 1970-2020

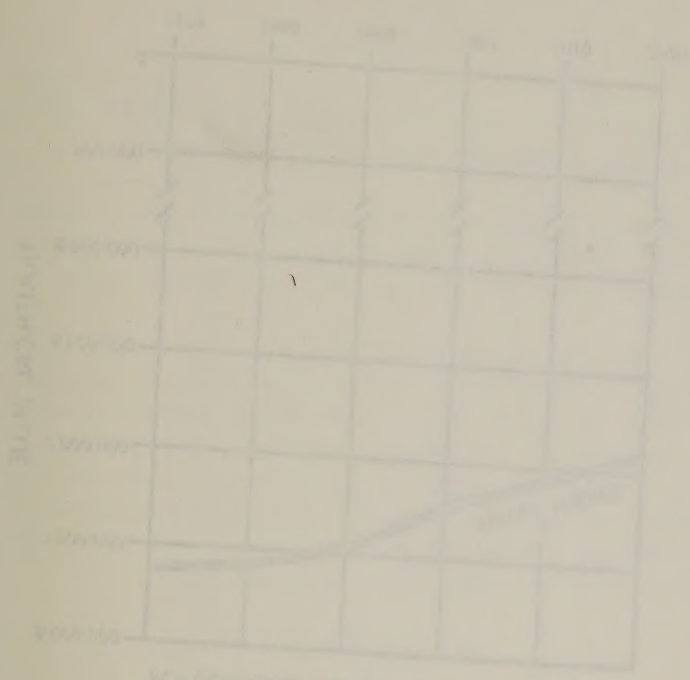


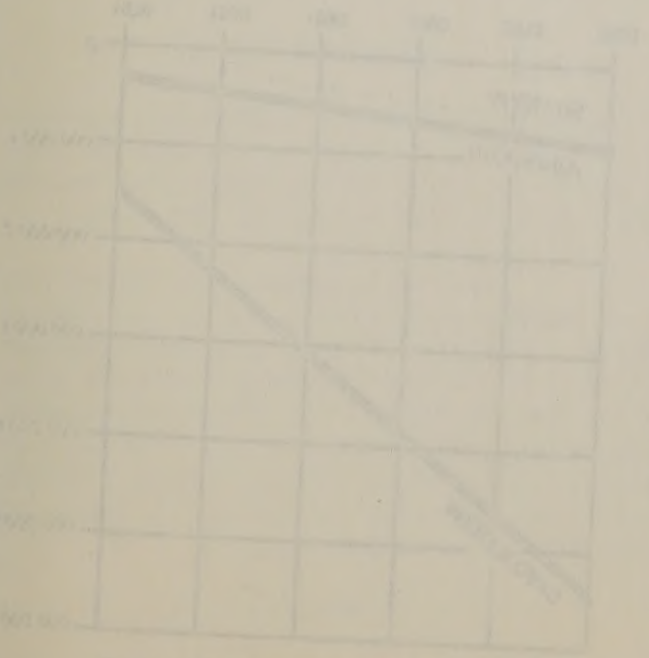
GRAPH 4

ALL FISH AND GAME DATA PROJECTI

RESIDENT AND NONRESIDENT ANGLERS AN HUNTERS ANGLER AND HUNTER DAYS STATEWIDE 1970-2020







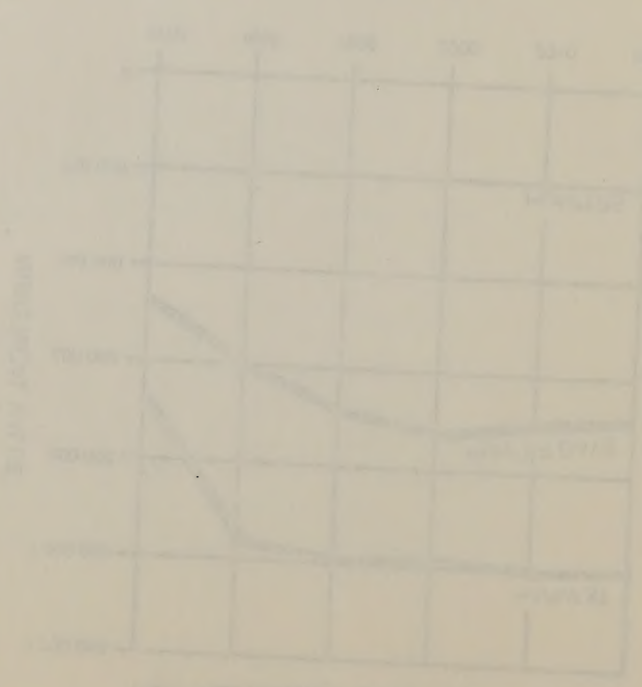


Table PAA-12

CALIENTE PLANNING UNIT
Fishing 1976

Fishable Length

Creek	Total Miles	Public Land Miles	Average Angler Days 1970-1976	Angler Days per Miles of Habitat	% Public Land Habitat
Beaver Creek	3.1	2.5	826	266	81%
Clover Creek	5	5	467	93	100%
Total	8.1	7.5	1293	160	93%

Fishable Acres

Reservoirs & Lakes	Total Acres	Public Land Acres	Average Angler Days 1972-1976	Angler Days per Acres of Habitat	% Public Land Habitat
Shroeder Reservoirs	80	0	2214	28	0
Echo Reservoir	240	0	4369	18	0
Pahranagat Lake	640	0	457	1	0
Total	960	0	7040	7	0

Notes:
Angler Days from "Creek Census" NDF&G (1970-1976). Figures taken on seven and five year average to minimize effects of annual fluctuation.

Fishable Length and Acreage from "Streams & Lakes Inventory" NDF&G (1975) and URA data.

Table PAA-13

CALIENTE PLANNING UNIT
Wildlife-Based Income and Employment
1976

Wildlife Category	Income Total[1]	Income Public Land[2]	Percent of Total[3] Income Dependent on Public Land Wildlife	Employment[4] Total	Employment[4] Public Land	Percent of Total[5] Employment dependent on Public Land Wildlife
Deer	$ 5,873	$ 5,814	0.04%	1	1	0.09%
Bighorn Sheep	484	484	0.004	0	0	----
Quail	21,084	16,867	0.13	3	2	0.18
Mourning Dove	14,921	14,623	0.11	2	2	0.18
Rabbit	16,781	16,446	0.13	2	2	0.18
Total Hunting	59,143	54,234	0.41	9	8	0.71
Fishing	15,499	2,236	0.02	2	0	----
Total Wildlife	74,642	56,470	0.43	11	8	0.71

Notes:
1/ Hunting income based on $6.20 local area expenditure per day - Garrett, 1970 (adjusted. Fishing income based on $2.79 local area expenditure per day - Johnson, 1978 (adjusted. Expenditures ÷ 1.5 = Income (BLM Manual 1607.)
2/ Public land income based on percent of habitat.
3/ Total county income 1976 = $13,107,455 - estimate calculated by BLM, Las Vegas from BEA, 1970-1975 and NESD, 1970-1976.
4/ Employment based on income/employee ratio for trade (6955) - calculated by BLM, Las Vegas from BEA, 1975 and NESD, 1975, 1976.
5/ Total county employment 1976 = 1130, NESD, 1976.

Demand projections for the Caliente Planning Unit are illustrated in Table PAA-14. In most areas it is not feasible to actually increase habitat areas. Improving the quality of habitats in order to support increases in the species populations is the more realistic approach.

Table PAA-14

CALIENTE PLANNING UNIT
Wildife Resources Demand Projections

Hunting

Species	1976 Hunters Days	Projected 1990 Hunter Days	1976 Public Land Habitat Acres	1990 Public Land Habitat Acres	Increase in Acres Required to Meet 1990 Demand	1976 Species Population	1990 Species Population	Increase in Population Required to Meet 1990 Demand
Deer	1,421	2,075	1,229,106	1,794,495	565,389	2,565	3,745	1,180
Bighorn Sheep	117	171	352,352	514,434	162,082	763	1,114	351
Quail	5,101	7,447	200,000	292,000	92,000	55,000	80,300	25,300
Mourning Dove	3,610	5,271	3,391,168	3,391,168	----1/	42,233	61,660	19,427
Rabbit	4,050	5,928	3,391,168	3,391,168	----1/	44,004	64,246	20,242

Fishing

Creek	Average Angler Days 1970-1976	Projected 1990 Angler Days	1976 Public Land Habitat Miles	1990 Public Land Habitat Miles	Increase in Public Land Habitat Miles Required to Meet 1990 Demand
Beaver Dam Creek	926	1206	2.5	3.7	1.2
Clover Creek	426	682	5	7.3	2.3

Notes:
1990 Hunter Days, Habitat Acres and Species Populations were based on a projected regional population growth of 46 percent between 1976 and 1990.

1/ No increases were projected for dove and rabbit habitat acres because they are found throughout the planning unit already.

.27 Recreation

A. Visitor Use

Table PAA-15 illustrates the estimated number of visitor days expended in the planning unit. Public lands accounted for 49,918 visitor days, which represents 32.3 percent of the 154,406 total visitor days. The most intensively used attractions were the units of the Nevada State Park System. Visits recorded for these area in 1976 were: 5,076 at Beaver Dam State Park; 35,196 at Echo Canyon State Recreation area; 14,561 at Kershaw Ryan State Park; and 67,903 at Cathedral Gorge State Park.

The planning unit provides recreation opportunities that are rare in Southern Nevada. It attracts a large number of recreationists from this area; about one half are from Clark County. California accounts for an additional one fourth of the recreationists in the planning unit. The rest of the recreationists come from the other counties of Nevada and from throughout the rest of the United States.

B. Income-Employment

Table PAA-16 illustrates the impact of recreation in the Caliente Planning Unit on the local economy. Recreation primarily effects the trade (food, tackle, etc.) and service (lodging, etc.) sectors of the economy.

Income produced from recreation on public land in the planning unit represents 1.51 percent of total county income. A total of 28 jobs are generated from recreation on public lands in the planning unit. This represents 2.48 percent of total county employment.

C. Population

Based on a population/employment ratio of 2.83 to 1, 79 people are dependent on recreation on public lands in the planning unit. This represents about 2.5 percent of the total county population.

D. Demand Projections

Changes in economic demand through the year 1990 can be roughly predicted by considering several factors that are expected to be at work during this period. The most significant factor is that of regional population growth. This growth is predicted to total a 46 percent increase by 1990. The construction of the White River (Sunnyside) Highway is expected to result in a minor decrease in number of persons passing through the eastern portion of the

Table PAA-15

CALIENTE PLANNING UNIT
Recreation Visitor Days Occurring in the
Caliente Planning Unit (1976)

Recreation Activity	Visitor Days		
	Total	Public Lands	Percent Public Lands
Hunting[1/]	14,309	14,023[3/]	98.0%
Fishing[1/]	8,333	1,202[3/]	14.5%
General Recreation[2/]	131,764	34,693	26.3%
Total	154,406	49,918	32.3%

Notes:
1/ Statistics developed in wildlife portion.
2/ NSEO, 1970 and Nevada State Parks System (NSPS); 1978.
3/ Based on percentage of public land habitat.

Table PAA-16

CALIENTE PLANNING UNIT
Recreation Income and Employment

Recreation Activity	Income		% of Total County Income Dependent on Public Land Recreation[4/]	Employment		% of Total County Employment Dependent on Public Land Recreation[5/]
	Total	Public Land		Total	Public Land	
Hunting[1/]	$59,143	$54,234	0.41%	9	8	0.69%
Fishing[1/]	15,499	2,236	0.02	2	0	----
General Recreation	534,962[2/]	140,854[2/]	1.07	77[3/]	20[3/]	1.79
Total	609,604	197,324	1.51	88	28	2.48

Notes:
1/ Developed in Wildlife Section.
2/ Based on $4.06 expenditure per day: Johnson, 1977 (adjusted). Expenditures ÷ 1.5 = Income: BLM Manual 1607.
3/ Based on income/employment for trade: calculated by BLM, Las Vegas from BEA, 1975 and NESD, 1975, 1976.
4/ Total county income 1976 = $13,107,455: calculated by BLM, Las Vegas from BEA 1970-1975 and NESD, 1976.
5/ Total county employment 1976 = 1130, NESD, 1976.

planning unit. No reliable estimates of how this decrease in traffic (and the corresponding increase in the accessibility from Clark County of what might be considered more desirable recreation resources in the Ely area) will affect the Caliente Planning Unit area are available. All that can be said is that there will be some minor decreases in visitation as a result of the highway's construction.

In view of the above, growth in general recreation is predicted to increase 40 percent by 1990. This is 6 percent lower than regional population growth because of the effects of the White River Highway. Table PAA-17 illustrates expected 1990 visitor use.

Table PAA-17

CALIENTE PLANNING UNIT
1990 Recreation Demand

Recreation Activity	1976 Visitor Days Total	1976 Visitor Days Public Lands	1990 Visitor Days Total	1990 Visitor Days Public Lands	% Increase 1976-1990
Hunting	14,509	14,023	20,897	20,474	46%
Fishing	8,333	1,202	12,166	1,755	46%
General Recreation	131,764	34,693	184,470	48,570	40%
Total	154,406	49,918	217,533	70,799	41%

.3 Social Values Analysis

.31 Socio-Cultural Values

The socio-cultural values section summarizes values of persons and groups as they relate to public lands. The values may be associated with an object, place or structure, or an intangible entity such as a belief, feeling, or way of life.

The basis for this section is a study of cultural values in Lincoln County conducted by Loren Reichert, Ph.D. and James Frey, Ph.D., Department of Sociology, University of Nevada, Las Vegas, and is included in the Lincoln County Social-Economic Profile.

A. Cultural Groups

The study identifies various sub-groups in the county and focuses on the value orientations of each group. The major differences in value orientations that serve to set apart sub-groups within the population are those relating to economic interest, social and economic change, and the importance of origins, kinship, and religion in establishing social and political influence. The bases of sub-group identification are not mutually exclusive. It is impossible to socially locate individuals in the community or to discuss their values exclusively in terms of a single affiliation. For example, a rancher and a businessman may both be Mormons, old-timers, and sportsmen. Overlapping memberships serve to minimize the existnece of clearcut factions within the county. Clearly distinct cultural groups (subcultures) do not truly exist within Lincoln County. Therefore, the following analysis of basic values held by Lincoln County residents proceeds in terms of eight major bases of social affiliation: retired newcomers (retired people who have lived in the county for ten years or less), newcomers (not born in Lincoln County), old-timers (born in the county), Mormons (those active in the Church of Jesus Christ of the Latter-Day Saints), sportsmen (those who hunt and fish regularly), ranchers, business and professional people, and influentials. Social affiliation is defined as social groupings to which respondents in the survey were assigned as "member" by the researchers or perceived by respondents.

Some of the similarities in value patterns reflected in Table PAA-18 are partially consequences of overlapping memberships. Influetials, for example, overlap with every other group with the exception of retired newcomers. These newcomer-retireds are, however, exclusive of the occupational categories and old-timers as well as the influentials. The business and professional group and ranchers are mutually exclusive categories (though some businessmen and professionals are hobby ranchers) as are the old-timers and newcomer categories. Consequently, two categories were added to

facilitate analysis even though those categories are not perceived by the residents as bases for social identification and group affiliation. "General public" contains all respondents not identified as influentials, and "non-Mormon" subsumes all respondents who are not actively involved in the Latter-Day Saints church.

The basic values of these "groups" were abstracted from responses to questions about their likes and dislikes concerning living in Lincoln County, the problems they see facing the county, and the circumstances under which they would consider moving from the county. The reported values and the frequencies with which they were evoked reflect emphasis upon those values associated with life conditions. Moral values and religious ideals are clearly under-emphasized in terms of frequency of response as the question format was not designed to evoke such a response. On the other hand, the association of the study with the Bureau of Land Management did condition informants to consider values relating to political and organizational impacts on their conditions of life. It should also be noted that the table presented reports the numbers of people, by categories, who displayed each indicated value. Hence, Table PAA-18 reports the consistency with which these values are held, not the degree of commitment with which they are held. (See Technical Report in the Lincoln County SEP.)

B. Social Values

Fourteen value-dimensions were identified after a content analysis of statements obtained from respondents. A review of sociological literature about rural communities added support and clarity to these dimensions.

Rurality: positive value placed on the small size of local communities and on the quality of rural life. "Anti-city" attitudes are commonly indicated in such expressions as "uncrowded" "less crime", and "less hustle and bustle, you can set your own pace".

Environmental: reference to climate, clean air, no pollution, and to the easy access to outdoor recreation, e.g., hunting and fishing.

Neighborliness: reference to mutual self-help, friendliness, and sociability. "When in trouble, someone will help at a moment's notice".

Familial: mentions of doing things as a family; of raising a family, and benefits to children.

Natural Order: expressions of a "balance of nature" notion; of "things being better before the government stepped in", a

reverence for the past and tradition, favoring no growth or very slight growth, mentioning no dislike or problems associted with living in Lincoln County.

Individuality: freedom, expressions of disgust over regulation of pinenut gathering and wood-cutting; doing what they want to do without formal restriction.

Equalitarianism: coded when the respondent was not able to detect group differences, or when expression such as "everyone is treated equally" and "doing things for the good of all" were employed.

Democracy, Self-determination: concern about "losing control to Washington", rising bureaucratic control, the "need for consulting the people", and for the communities to work together.

Practicality: expressions favoring economic solutions to problems, short-term views on land use, irritation over activities which seem to prolong or make more difficult situations which, in the respondent's view, could be handled more swiftly and efficiently, e.g., "You can't develop a spring without an environmental impact statement".

Change: a desire for growth, economic development, bringing in new industry; the view that "old-timers are holding things back".

Property Ownership: references to the people owning the land and not the BLM; favoring releasing the land for private development.

Education: expressed need for new or changing schools, or that education was an important consideration with respect to staying in, or liking, Lincoln County.

Religion: fatalistic views, e.g., "God's will", etc., and reference to church activities and their importance in the respondent's life.

Honesty, Trust: reference to these traits in relation to local government and to the character of residents, "no need to lock your door"s, etc.

C. Results

A strikingly high consistency of mention within and between groups may be observed concerning the first five of these value-dimensions. Rurality, environmental values, neighborliness, family, and natural order appear as the central themes of Lincoln County. In this, residents of Lincoln County are similar to Americans who have been studied in other rural communities. "Rurality" is the key value dimension and deserves emphasis. It

Table PAA-18

CALIENTE PLANNING UNIT
Consistency of Values:
Proportion of Subpopulation Members Expressing Indicated Values

	Rurality	Environmental	Neighborliness	Familial	Natural Order	Individuality	Equalitarianism	Democratic Self Determination	Practicality	Change	Property	Education	Religion	Honesty, Trust
*General Public	HI	HI	HI	MOD	MOD	LO	LO	LO	LO	LO	VLO	LO	VLO	VLO
Influentials	VHI	MOD	HI	HI	HI	VHI	HI	HI	HI	MOD	MOD	LO	LO	LO
New Retireds	VHI	VHI	HI	MOD	HI	LO	HI	LO	LO	LO	LO	LO	VLO	LO
Newcomers	HI	HI	HI	MOD	MOD	MOD	MOD	LO	LO	LO	VLO	LO	VLO	LO
Sportsmen	HI	HI	MOD	MOD	HI	MOD	MOD	LO	MOD	LO	LO	LO	VLO	VLO
Ranchers	HI	HI	HI	VHI	HI	LO	MOD	LO	LO	VLO	LO	LO	LO	VLO
Old-Timers	VHI	HI	MOD	HI	HI	MOD	LO	LO	LO	VLO	LO	LO	LO	VLO
Mormons	VHI	HI	HI	HI	HI	MOD	MOD	LO	LO	LO	LO	LO	MOD	VLO
*Non-Mormons	HI	HI	HI	MOD	MOD	LO	LO	LO	LO	LO	LO	LO	VLO	VLO
Business-Professional	VHI	HI	HI	MOD	HI	HI	MOD	MOD	MOD	MOD	LO	LO	LO	LO

Key: Very High (VHI) 80%+ or more of the respondents in this group expressed this value
High (HI) 60-79%
Moderate (MOD) 40-59%
Low (LO) 20-39%
Very low (VLO) 0-19%

*These categories were not specifically mentioned by the population of Lincoln County but are included for the purpose of comparison.

Source:
Loren Reichart and James Frey, Lincoln County Value Survey. Las Vegas, Nevada, June 1976.

can be easily related to any of the BLM policies--these all may be viewed as an encroachment on rural life which is really inclusive of most of the other value dimensions.

Change is a value that is seldom expressed by the general public. Even among those groups more inclined to favor change (businessmen-professionals and influentials), change is most often qualified in terms of "progress" that would preserve, or at least not upset, the natural order. Typically, these people favor economic development sufficient to provide jobs so that young residents would not have to move away to find work. This was often mentioned as change that would modestly and gradually increase the population without altering the rural character of the county. Yet even this limited view of change is contrary to the views of old-timers and ranchers (50 percent of whom are old-timers) who define natural order in terms of the status quo. One rancher, who is also an influential, expressed the fear that growth means housing and that "houses would be built in the good bottom-lands".

Similarly, the political values of individuality, democracy, and practicality hold greater salience for the businessmen - influentials than for the ranchers and old-timers. The businessmen define the BLM as "landlocking" the communities by controlling land that would otherwise be available for industry, housing, and their own interest in owning acreage for hobby-ranching.

Few respondents identified specific places, areas, or objects within Lincoln County as holding particular value for them other than those places incorporated within the State Park System, or marked as historic sites. Ella Mountain, the Panaca and Caliente summits, Gleason Canyon, and Ash Springs were mentioned as places of value. The places of value were mentioned in every case as favorite locations for picnics and family outings. It is perhaps safe to interpret Lincoln County in its entirety as a place to be preserved rather than to concentrate on a few specific places.

It is important to emphasize the stability of the population of Lincoln County. "There is really no reason to expect the people or the land to change. Perhaps the future changes in Lincoln County will come only if the state or private developers take over the land or if there is an influx of industry. Perhaps the persons who value rurality so much have not realized that the BLM, by controlling the use of the lands, is really acting on their behalf and actually preserving that rurality." (Dr. Frey)

"People in Lincoln County, in general, may be said to value preservation of the county as it was in traditional usage and to do so without interference. This presents some inconsistencies

and conflicts which they may be generally unaware of; e.g. that traditional usage itself may alter the character of the land; that different perspectives exist within the community itself concerning the natural, traditional usage of land (business vs. rancher).

.32 Social Well-being

This section is intended to compare certain social well-being factors in Lincoln County and the State of Nevada by examining common quantifiable indicators. These indicators are population change, per capita income, migration patterns, the unemployment rate, and per capita spending in public service categories such as health, education, public safety, hospitals, and roads. An additional indicator measures employment dependence on the two largest industries in the county and is compared to the State average.

A. Identification and Nature

Population Change: Though the population has declined in Lincoln County from levels reached in the 1940's and 1950's, the trend reversed in 1960. Since 1960, the population has been nearly stable, experiencing a growth rate much less than that of the State.

Per Capita Income: The per capita income of rural Lincoln County is not directly comparible to the per capita income of Nevada which is largely determined by the incomes of highly urbanized Clark and Washoe counties. However, comparing the two can give a general indication of the relative economic well-being of Lincoln County residents. In 1975 the per capita income of Lincoln County was only 75 percent of the per capita income of Nevada.

Migration Patterns: Between 1970 and 1973 Lincoln County had a net migration of -15.9 percent while the state experienced a net migration of +8.6 percent. This is an indicator of employment opportunities in the county and reflects fluctuations in the mining industry. When mining activities increase, as they did in the Pioche and Tempiute areas in 1976 and 1977, in-migration occurs and affects this variable. The large negative net migration between 1970 and 1973 was primarily caused by a decrease of 60 percent in mining employment during that period. The recent mining boom has resulted in significant in-migration, especially in the Tempiute area.

Unemployment Rate: In 1977, Lincoln County had an unemployment rate of 5.9 percent, slightly lower than Nevada's 6.3 percent.

Per Capita Spending In Public Service Categories: In all areas except public safety, per capita spending in Lincoln County was less than that of the State. While this may indicate a reduction in social well-being in the county, it may also be the result of excess capacity already present in the system. Per capita spending for roads, for example, is much less in the county as opposed to the State; however, the county has a good road system capable of

meeting existing needs. Per capita spending for health, however, is somewhat lower in the county and this may indicate a lack of some health services which may be available in other areas of the State. Once again, though, because of the relatively stable population size coupled with good existing facilities, the lower per capita spending in Lincoln County may be merely a reflection of excess capacity and an absence of heavy demand for health services.

Employment Dependence: Another measure of social well-being is the dependence on the two largest industrial sectors for employment. It is generally believed that an area is in a better position, in respect to employment stability, if it is not highly dependent on one or two industries. High dependence on one or two industries subjects an area's employment to fluctuation in those industries to a much greater degree than when employment is broadly-based in many various industries. Taking an average of each county's two largest industrial sectors, a dependency figure typical for counties of the State is 60 percent. Employment in the two largest categories in Lincoln County (government and trade) accounts for 56 percent of total employment. The difference between these two figures is insignificant, but when compared to an overall national dependence of 45[1/] percent they indicate that the counties of Nevada, including Lincoln, are heavily dependent on one or two industrial sectors for employment.

B. Significance

Table PAA-19 compares Lincoln County with Nevada in terms of the common quantifiable measures discussed in the previous section. It indicates areas where Lincoln County is statistically different from the State. Whenever an indicator differs greatly from that of the State, the difference may be considered significant. Significant areas are considered as either enhancing or reducing social well-being. However, it must be noted that when considering community social goals and desires, various areas may not be judged significant as to well-being by the residents of that community. Additionally there may be special circumstances affecting the indicator as discussed in the previous section.

C. Social Well-Being Thrust Analysis

Table PAA-20 lists those social well-being factors that may be affected by each resource activity. Resident perceptions are considered and general types of program thrusts which can serve to enhance social well-being are identified.

1/ Survey of Current Business, July, 1976.

Table PAA-19

CALIENTE PLANNING UNIT
Significance of Social Well-Being

Well-Being Factors	State	County	Percent Difference
Population Change[1/]			
1960 - 1970	5.53%	0.51%	-91**
1970 - 1975	3.61%	1.26%	-65
Per Capita Income[2/]			
1975	$6,673	$4,980	-25**
Net Migration			
1970 - 1973	+8.6%	-15.9%	-285**
Unemployment Rate[3/]			
1977 - third quarter	6.3%	5.9%	-6
Per Capita Spending public service categories			
Health	$13	$4	-69
Education	$251	$208	-17
Public Safety	$36	$36	0
Hospitals	$72	$55	-24
Roads	$141	$54	-62
Percent employment in largest two industries[4/]			
1976	60%	56%	-7

* Significant in enhancing social well-being
**Significant in reducing social well-being

1/ Average annual rate of change
2/ BEA, 1975
3/ Nevada Review of Business and Economics; Winter 1977
4/ NESD, 1977

Table PAA-20

CALIENTE PLANNING UNIT
Social Well-Being Thrust Analysis

Resource Activity	Well-Being Factors	Resident Perceptions	Program Thrust Narrative
1. Lands	Population change	Feel that population size is increasing at a desirable rate	When need arises make land available to accommodate growth and promote diversity in urban-suburban expansions.
	Personal income		
	Employment dependence and diversification		
	Per capita spending on public services	Feel that county is hampered by small tax base	Land transfers under public purpose opportunities.
2. Minerals	Personal income		Within environmental and other constraints, should not hinder mineral exploration.
	Migration patterns		
	Employment	Feel that mining is necessary	
	Per capita spending on public services		Increased public tax revenue generated by increased mining activities at the same time may put strain on infra-structure.
3. Woodland Products	Employment	Believe wood production is a potential source of new employment	Encourage increased production which would generate new sources of income.
4. Range Management	Personal income	Local and national interests want improvement of public lands	Range improvements that promote increases in production efficiency will increase per capita income

Table PAA-20 (cont.)
Social Well-Being Thrust Analysis

5. Wildlife	Personal income	Want a larger game population	Increase hunter and visitor activities by increasing wildlife population
6. Recreation	Employment	Most would like to see increased tourism	Provide opportunities that promote increase employment and new sources of income.
	Personal income		
	Per capita spending on public services		Increased recreational activities may put strain on infrastructure (i.e. public safety)

D. Visual Resource Management

Visual Sensitivity Levels and Visual Zones: Visual sensitivity levels are an index as to the relative importance or value the general public may place upon the visual resource within the district or planning unit. The steps to sensitivity level evaluation are: criteria selection, criteria weighting, and field classification and mapping of all land into one of three visual sensitivity levels (high, medium, low). The criterion developed are assigned a weight based upon their relative degree of importance. All areas of similar sensitivity are then delineated on the base map, based upon type of use, volume of use, and other criteria as appropriate. The criteria used and the respective weights are:

Criteria	Weight
Use Volume (Cars and Trucks)	4
Use Volume (Airplanes)	1
Use Association (primarily deals with recreation use)	6
Community Attitudes	5
Land Use (in relationship to non-BLM land use or to the use of BLM land under permit/license)	3
Other Agency Planning Attitudes	2

Visual zones are delineated based upon the scenery quality rating assigned the various areas within the planning unit. The zones are the foreground-middleground, background, and seldom-seen.

The visual resource levels and distance zones will be utilized in developing Step 1 of the Caliente Planning Unit Management Framework Plan's visual resource management component.

Table PAA-21

CALIENTE PLANNING UNIT
Visual Sensitivity Levels

Number	Area Name	Sensitivity Level High	Med.	Low
101	Humboldt Mtn. Range		X	
102	Penoyer and Tikaboo Valley			X
103	Tempiute			X
104	Groom Mtn. Range		X	
105	Pahranagat Range			X
106	East Pahranagat Range			X
107	Crystal Springs		X	
108	Paharanagat Valley		X	
109	Paharanagat Game Range	X		
110	Sheep Range East Boundary		X	
111	Hiko Range			X
112	North & South Pahroc Range			X
113	Dry Lake Valley & Delamar Valley			X
114	Delamar Ghost Town		X	
115	Delamar Mtns.		X	
116	Kane Springs Valley		X	
117	Meadow Valley Mtns.			X
118	Meadow Valley - South of Elgin			X
119	Rainbow Canyon		X	
120	Mormon Mtns.		X	
121	Tule Desert			X
122	Clover Mtns.		X	
123	Ella Mtn.		X	
124	Kershaw-Ryan State Park	X		
125	Caliente		X	
126	Lower Clover Creek		X	
127	Upper Clover Creek		X	
128	Barclay			X
129	Meadow Valley - South of Panaca			X
130	Cedar Range		X	
131	Beaver Dam	X		
132	Panaca			X
133	Cathedral Gorge State Park	X		
134	Dry Valley			X
135	Echo Canyon	X		
136	Deer Lodge Canyon		X	
137	Pioche			X
138	Highland Peak	X		
139	Chief Range			X

.33 Public Positions and Expectation Analysis

Groups and agencies are tabulated by the resource acitvity in which they have shown past interest or involvement. Some groups or agencies may be related to more than one activity. Due to the wide variety of resource activities recommendation, it would be impossible, and probably inappropriate, to attempt to forecast group reaction in each instance.

A. Grouping of Publics by Resource Activity

1. Lands Resource

League of Women Voters
Nevada Division of State Parks
Nevada State Division of Water Resources
Nevada State Fish and Game Department
U. S. Fish and Wildlife Service
U. S. Army Corp of Eningeers
Sierra CLub
U. S. Air Force
Lincoln County Commissioners
Governor's Office of Planning Coordination

2. Forestry

Nevada Outdoor Recreation Association
National Campers and Hikers
Cactus and Succulent Society
Committee on Federal Land Conservation
National Public Lands Task Force
U. S. Forest Service - (Humboldt National Forest)
Sierra Club
Nevada State Department of Agriculture
Commercial Firewood cutters
Town Council - Caliente
Town Board - Panaca
Town Board - Pioche
Town Board - Alamo
Desert Research Institute
Nevada State Federation of Garden Clubs
Caliente Chamber of Commerce
Caliente Rotary Club

3. Wildlife Resource

Audubon Society
Pioche Rod and Gun Club
Ducks Unlimited
Fraternity of the Desert Bighorn

Nevada Organization for Wildlife
Lincoln County Fish and Game Association
Nevada Fish and Game Commission
Nevada Fish and Game Department
U. S. Fish and Wildlife Service
Nevada Wildlife Federation
Nevada Organization for Wildlife
Archer's Association Inc.
Birch Creek Gun Club
Desert Sportsman Rifle and Pistol Club
Las Vegas Sportsman
Nellis Rod and Gun Club
Rod and Gun Club
Virgin Valley Sprotsman's Association
U. S. Air Force
Desert Research Institute
Caliente Chamber of Commerce
Caliente Rotary Club

4. Wildhorse and Burro Resource

National Wildhorse Association
National Mustang Association
Nevada Mustang Association
Range Livestock Users
U. S. Fish and Wildlife Service
Cedar City District BLM
Ely District BLM
International Association for the Protection of
Wild Horses and Burros
Nevada Outdoor Recreation Association
Nevada Committee on Public Lands (Livestock)
Nevada Department of Fish and Game
Natural Resources Defense Council
Nevada State Horseman's Association
Wildhorse Organized Assistance Inc.
U. S. Air Force
Nevada Cattleman's Associaton
Nevada Woolgrowers Association

5. Range Management Resource

Nevada Cattleman's Association
Nevada Woolgrowers Association
National Wildhorse Association
Nevada Mustang Association
Range Users
U. S. Air Force
Nevada Wildlife Federation
Natural Resource Defense Council
Nevada Committee on Public Lands (Livestock)

6. Watershed

U. S. Air Force
U. S. Fish and Wildlife Service
Humboldt National Forest
Nevada Outdoor Recreation Association
Lincoln County Commissioners
Nevada Department of Fish and Game
Nevada Wildlife Federation
Sierra Club
Nevada Committee on Public Lands
Pioche Rod and Gun Club
Soil Conservation Service
Lincoln County Conservation District
Town Council - Caliente
Town Board - Panaca
Town Board - Pioche
Town Board - Alamo
Desert Research Institute

7. Recreation Resource

American Camping Association
Antique Bottle Club
Archer's Association Inc.
Nevada Historical Society
Las Vegas Jeep Club
National Campers and Hikers Association
Sierra Club
Wilderness Society
Southern Nevada Off-Road Enthusiasts
Cactus and Succulent Society
Environmental Studies
Mesquite Club
Archeo Nevada Society
Nevada Division of State Parks
Nevada State Fish and Game Department
Motorcycle Racing Association of Nevada
Southern Nevada Museum
Nevada Outdoor Recreation Association
Nevada Resort Association
League of Women Voters
University of Nevada - Dr. Sheilagh Brooks
Lincoln County Commissioners
Humboldt National Forest
U. S. Fish and Wildlife Service
U. S. Air Force
Town Council - Caliente
Town Board - Panaca
Town Board - Pioche
Town Board - Alamo

Governor's Office of Planning Coordination
Desert Research Institute
Caliente Rotary Club
Caliente Chamber of Commerce
Nevada State Federation of Garden Clubs

8. Minerals Resource

Gem Club
Gem Collectors Inc.
Intermountain Exploration Co.
Mine Examination and Exploration Engineer
Nevada Bureau of Mines
Nevada Mining Association
Nevada Prospectors Association, Inc.
Southern Nevada Chapter of the Western Co.
Union Carbide
Pioche Mining Companies
U. S. Geological Survey
U. S. Bureau of Mines
Desert Research Institute
Neavda Highway Department
Lincoln County Roads
Southern Nevada Prospecting Association

.4 Infrastructure

Lincoln County received $132,350 from the Bureau of Land Management in 1977 under Public Law 94-565 (Payments in lieu of Taxes). This payment was to compensate the county for its limited tax base due to the public ownership (tax free) of a large portion of its land. The payment contributed to the county's ability to pay for its public infrastructures. In 1977 most of this payment was allocated to corrections and health services.

The Bureau of Land Management also contributes to Lincoln County's ability to pay for its public infrastructures indirectly through payments to the state. The state get 50 percent of all mineral lease receipts and five percent of the sale of all lands and materials by the BLM. Sales of lands and materials in the planning unit contributes about $1,250[1/] to the state in 1977. Minerals leasing in the county contributed $248,000[2/] to the state. These lease payments were allocated to the school distributive fund for payment to the counties on a per-pupil basis. The land and materials payments enter a permanent fund. Only the interest from this fund is allocated to the school distributive fund, the actual payments cannot be used. Table PAA-22 is an index to further information on infrastructures, (ground work) agreements, and relationships in the Caliente Planning Unit. Also displayed are the resource activities which they impact, or which affect the infrastructures or relationships. This is an index of information contained in the Lincoln County Social-Economic Profile (1606). The SEP also includes a review of relationships between the BLM and other agencies in terms of obligations and commitments on BLM programs or activities. (All relationships are covered generally; specific relationships discussed are denoted by an "x".)

1/ Five percent of the receipts from sales of sand, gravel and woodland products.

2/ Estimate calculated by BLM, Las Vegas.

Table PAA - 22

CALIENTE PLANNING UNIT
Infrastructure and Bureau Relationships Data Index

	Data in Social-Economic Profile	Lands	Minerals	Forestry	Range	Watershed	Wildlife	Recreation	Cadastral Survey	Roads & Trails	Fire Control
Transportation	p 54									X	
Communication	54										
Fire Control	57										
Land Survey	57										
Public Utilities	59										
Water & Waste Disposal	60	X									
Health Systems	62										
Education	63										
Law Enforcement	64										
Public Safety	64										X
Public Attitudes	14	X	X	X	X	X	X	X			
Other Agencies											
Federal:											
U. S. Geological Survey	68										
U. S. Bureau of Mines	68										
U. S. Army Corps of Engineers	68										
U. S. Soil Conservation Service	68										
U. S. Fish & Wildlife Service	69										

Table PAA-22 (cont.).

CALIENTE PLANNING UNIT
Infrastructure and Bureau Relationships Data Index

	Data in Social-Economic Profile	Lands	Minerals	Forestry	Range	Watershed	Wildlife	Recreation	Cadastral Survey	Roads & Trails	Fire Control
State:											
Coop. Extension Service	P 68										
Nevada Highway Department	69										
Nevada Department of Fish and Game	69										
Nevada Division of Forestry	17			X							
State Clearinghouse											
State Land Use Planning Agency											
Nevada State Parks	16	X						X			
Local:											
Lincoln County Commission	69										
Caliene City Council											
Lincoln County TV District	70										
Action, Study, and Interest Groups:											
Sierra Club											
Nevada Prospector's Association											
Nevada Cattleman's Association											
Wild Horse Organizational Assistance											
Bibliography											

Table PAA-22 (cont.)

CALIENTE PLANNING UNIT
Infrastructure and Bureau Relationships Data Index

	Data in Social-Economic Profile	Lands	Minerals	Forestry	Range	Watershed	Wildlife	Recreation	Cadastral Survey	Roads & Trails	Fire Control
Nevada Open Space Council National Resource Refuse Council Cooperative Relationships	Bibliography										

.5 Critical Environmental Area Analysis

Steps 3 and 4 of the Environmental Profile have identified some environmentally important areas of public lands that BLM feels should be protected.

Parts of the South Pahroc and Clover Mountains are proposed primitive areas while the Pahranagat Range, Mormon Mountains, and Gleason Canyon have been identified as primitive study areas. These areas are nationally significant because they (1) contain natural lands as yet unspoiled by civilization, (2) contain ecological, geological, or other features of scientific or scenic values, and (3) provide opportunity for a unique recreational experience.

Five regionally significant botanical areas that have been identified in the Caliente Planning Unit include the Highland Peak Botanical Area, East Mormon Barrel Cactus Area, Delamar Joshua Tree Forest, Quaking Aspen Spring, and Cabin Pines.

In addition, three geological sightseeing areas on public lands that merit attention are Pennsylvania Canyon, Teepee Rocks, and "the Crack". All of these areas have regional significance.

The cultural resource values present in the Caliente Planning Unit are important regionally and may prove upon further investigation to have national significance. The Beaver Dam, Pahranagat Valley, and Meadow Valley Wash have been identified as critical archaeological areas, while O'Malley and Conway shelters and Etna Cave have especially been identified as important archaeological sites. The Panaca Charcoal Kilns have already been nominated to the National Register of Historic Sites.

Quite a number of crucial wildlife habitat areas are scattered throughout the Planning Unit. These areas are identified as "crucial" because they contain a relative abundance of palatable forage and permanent supplies of water.

Crucial deer summer and winter ranges are contained within the Clover Mountain and Beaver Dam areas outlined on Environmental Profile Overlay #2. The summer ranges like Bunker Peak and Ella Mountain provide forbs which are important to the animals' diet.

The winter ranges like Barclay burn and Simpkins seeding provide desirable shrub species. Crucial bighorn areas which are present within the Mormon Mountains and Meadow Valley Range provide a combination of good forage, water, and isolation from man's activities. A good supply of water, food, and cover is available for small game and nongame animals in Meadow Valley Wash. Bighorn and mule deer populations are popular big game animals in the State of Nevada, while quail, rabbits, and mourning dove are important small game species.

Because aquatic habitats are so scarce in Southern Nevada, such areas in the Caliente Planning Unit take on special significance. These include Ash Spring, Upper and Lower Pahranagat Lakes, Crystal Spring, Meadow Valley Wash, Clover Creek and Beaver Dam Creek.

Ash Spring, the Pahranagat Lakes, Crystal Spring, and Beaver Dam Creek have additional importance in that they contain endangered or protected fishes or snails.

There are other environmentally significant areas in the planning unit which are not on public lands.

More than 4,000 acres are managed by the State of Nevada. They include four state parks. The Beaver Dam State Park is noted for its perennial fishable stream and pleasant camping and picnicking atmosphere. Cathedral Gorge contains unique geological formations. Kershaw-Ryan provides a shady retreat close to the town of Caliente. Echo Canyon has a reservoir, interesting rock formations, and marks the transition zone between cold northern desert vegetation (sagebrush and shadscale) and pinyon/juniper woodlands. The State also manages Frenchy Lake, south of Hiko, which gets some waterfowl use.

The U. S. Fish and Wildlife Service is in charge of the Pahranagat National Wildlife Refuge which covers about 5,000 acres. This area is important as a site for wildlife (waterfowl, small game, and nongame animals), nature study, hunting, and picnicking.

The Nevada State Park System has also expressed interest in acquiring certain public lands as additions to these state parks. They have submitted Recreation and Public Purposes Applications for the purchase of the following areas:

1) 160 acres near Echo Canyon State Park (T. 1 N., R. 69 E., Section 29, SW¼).

2) 320 acres near Kershaw-Ryan State Park (T. 4 S., R. 67 E., Section 18, SE¼, SE¼SW¼; Section 19, N½SE¼, NE¼SW¼).

3) 2,952.5 acres near Beaver Dam State Park (T. 5 S., R. 71 E., Section 4, S½; Section 5, W½; Section 7, all; Section 9, N½; Section 18, N½, SE¼; Section 20, all; Section 21, SW¼NW¼, W½SW¼, SE¼SW¼; Section 8, N½NW¼).

4) 360 acres near Cathedral Gorge State Park (T. 1 S., R. 68E., Section 19, SW¼, S½NW¼, W½SE¼, SW¼NE¼).

The Nevada State Parks System feels that the acquisition of these lands would allow more efficient management and maintenance of the park, would help protect geographical, historical, and scenic values, and would increase recreational opportunities. Some of the proposed uses of these lands include overlooks, interpretative exhibits, trails, and campgrounds.

.6 Problems and Issues Summary

Table PAA-23 presents a summary of problems and issues in the planning unit. Identified areas of concern, both local and nonlocal, are presented. The summary draws from the separate sections presented earlier in this Planning Area Analysis, from the Lincoln County Social-Economic Profile and from the Unit Resource Analysis for each specific resource in the planning unit.

Table PAA-23

CALIENTE PLANNING UNIT
Problems and Issues Summary

Problems/Issues	Social	Economics	Remarks
Restriction on tax base brought about by public ownership of land	Hampers growth of social amenities (development of parks, recreation centers, etc.)	Restricts revenues that provide goods and services. However, the county does receive significant payments in lieu of taxes.	
Communities are landlocked because of public ownership of surrounding areas	Does not allow for residential expansion with present lifestyles.	If landlocking results in densely populated communities--the costs of providing public services will probably be lower.	While these are obvious and real concerns of residents in the county, the Lincoln County Master Plan identifies existing vacant non-agricultural private land within the communities that could be utilized to accommodate the projected population growth levels.
Mineral regulations	Restricts freedom to pursue lifestyle	Reduces employment opportunities	Miners feel access should not be hampered or discouraged.
Environmental concerns relating to mining	Possible aesthetic and environmental damage	May reduce recreation industry	Environmental groups strongly oppose unrestricted mineral exploration and extraction.
Harvesting of desert vegetation	Current regulations encourage vegetative trespass and discourage the use of low water-demand plants in residential gardens.	Issuing limited harvesting permits (non-commercial) would tend to keep landscaping costs down.	Nurseries in the region find it very difficult to obtain desert vegetation from legal sources.

Table PAA-23 (cont.)

CALIENTE PLANNING UNIT
Problems and Issues Summary

Problems/Issues	Social	Economics	Remarks
Harvesting of live trees for firewood	Area residents see no reason why firewood harvesting should be restricted to dead or down wood. This attitude seems to be strongest in relation to areas that are very densely stocked with pinyon-juniper trees and could be improved for wildlife and livestock use by being thinned.	Allowing the cutting of green trees for firewood would result in shorter trips for local wood cutters while providing the benefits of thinning densely stocked stands.	The cutting of live trees for firewood would require very close supervision to prevent the proliferation of roads and the accumulation of slash (a fire hazard).
Regulations relating to forest products	Restricts what planning unit residents feel are "traditional" freedoms.		Lincoln County residents feel most of the regulations concerning the gathering for forest products are unnecessary.
Declining range suitability	Deterioration of ranching lifestyle	Decrease stability of ranch operators, and livestock production capacity.	

Table PAA-23 (cont.)

CALIENTE PLANNING UNIT
Problems and Issues Summary

Problems/Issues	Social	Economics	Remarks
Competition for forage by livestock, wild horses, wildlife and watershed protection	May cause local-non-local conflict	May cause reduction in ranch income if livestock grazing is reduced. May also increase income in county as a result of better hunting opportunities brought about by increased wildlife population.	Wildlife, wild horse and environmental groups feel mutiple-use management is required to provide resolutions of conflicts.
Regulations relating to range management	Ranchers feel overly controlled by federal government	Reductions of grazing privileges reduce income	Users of Federal range feel that wildlife and wild horse groups are interfering with the livestock industry.
Decreased wildlife populations	Deterioration of local lifestyle	Decrease in general recreation and hunter related revenues	A quota system has been instituted in the planning area because of decreased deer population.
Acquisition of public land for park purposes	May cause local and non-local conflict. Also, local land owners fear being forced to sell their property.	Local residents claim loss to their economic base. For example, the transfer of park lands may decrease the livestock forage available	Transfer of such land to public agencies is a stated purpose of the Recreation and Public Purposes Act.

Table PAA-23 (cont.)

CALIENTE PLANNING UNIT
Problems and Issues Summary

Problems/Issues	Social	Economics	Remarks
		to a grazing operator. However, addition of park lands will probably improve recreational income and employment.	
Wild horses/burros cause hazardous conditions on highway.	Possible injuries and death may result from horse/burro-auto accidents.	Loss of property may result from horse/burro auto accidents	
Wild horses/burros are living symbols of the historic and pioneer spirit of the West. They contribute to the diversity of life forms within the nation and enrich the lives of the American people (Wild Horse and Burro Act).	Wild horses and burros have great aesthetic value to some people.		
Wild horse/burro management is greatly restricted by PL92-195.	There are many public objections to any attempt at wild horse and burro management. (persons sympathetic to wild horses/burros)	Roundups and placement are expensive. Because of this fact there are few roundups and the vegetation and soil resources decline.	

Table PAA-23 (cont.)

CALIENTE PLANNING UNIT
Problems and Issues Summary

Problems/Issues	Social	Economics	Remarks
Areas with severe or rising SSF (soil surface factors) ratings and areas with deteriorating range conditions.	Restrictions necessary to improve this condition will adversely affect several land uses--ORV's, grazing.	Modification of livestock grazing could have economic impact on range users.	
Potential damage to critical archaeological sites are areas--Beaver Dam, Panaca Charcoal Kilns, Delamar Cemetery, O'Malley Shelter	Potential loss of irreplacable cultural values and clues to past life in southern Nevada.	Potential loss of recreation income and employment.	Vandalism, illicit collection are primary causes of the problems; surveys, restorations, interpretations, protection are some of the solutions.
Deteriorating aquatic and riparian habitat throughout the planning unit.	Leads to decrease in wildlife which leads to a decrease in quality of hunting, wildlife and sightseeing.	Leads to a decrease in wildlife which leads to drop in hunting and fishing days (and loss of revenue to State and local businesses).	Major causes include overgrazing contamination, and periodic flooding.
Unstable economic base--leads to periods of boom and bust.	Boom periods are characterized by rapid population growth which has cuased strains on social infrastructures. Bust periods characterized by high outmigration. Family and other social ties are weakened.	Boom periods strain the ability of a community to provide basix services. Bust periods characterized by high unemployment and low income.	Any action which broadens and stabilizes the economic base must be considered positive.

CALIENTE PLANNING UNIT
PLANNING AREA ANALYSIS

Bibliography

Minerals

Bureau of Business and Economic Research, University of Nevada, Las Vegas, NEIRS System, 1977.

Engineering and Mining Journal, March 1977.

Lincoln County Record, December 12, 1977.

Nevada Bureau of Mines and Geology, "Analysis for Lincoln County, Nevada", Forecasts for the Future-Minerals. Carson City, Nevada, 1972.

_____, Geology and Mineral Deposits of Lincoln County, Nevada. Carson City, Nevada, 1970.

Nevada Tax Commission, Net Proceeds of Mines Assessments. Carson City, Nevada, 1977.

U. S. Bureau of Land Management, Field Handbook for Minerals Examiners. Washington, D.C., 1974.

U. S. Bureau of Mines, Commodity Data Summaries, 1976. Washington, D.C., 1976.

_____, Mineral Facts and Problems, 1970. Washington, D.C., 1970.

Wall Street Journal, March 14, 1978.

Range

Garrett, James and Burke Mitchell, Characteristics of the Range Cattle Industry Region I - Southern Nevada. UNR, 1978.

U. S. Bureau of Land Management, Grazing License Billing Records, 1977.

_____, Operator Analysis, 1977.

U. S. Department of Agriculture, Div. of Ag. & Res. Econ., UNR, and Nevada State Dept. of Agriculture, Nevada Agriculture Statistics. Reno, Nevada, 1976.

Wildlife

Garrett, James R., Characteristics of Nevada Hunters. University of Nevada. Reno, Nevada, June 1970.

Nevada Department of Fish and Game, Big Game Investigations and Hunting Season Recommendations, 1977. Reno, Nevada, 1977.

_____, Creel Census. Reno, Nevada, 1970-1976.

_____, Streams and Lakes Inventory. Reno, Nevada, 1975.

_____, Upland Game, Migratory Game Birds, Fur Investigations and Hunting Season Recommendations, 1977. Reno, Nevada, 1977.

_____, Wildlife Population Estimates, Distribution and Forage Requirements for the Caliente Resource Area. Reno, Nevada, 1976.

Recreation

Nevada State Parks System, Surveys Data Comparison. Carson City, Nevada, 1978.

General

BRI Systems, Incorporated, Agricultural Potential of National Resource Lands in the State of Nevada. Phoenix, Arizona, 1976.

Bureau of Economic Analysis, "Analytical Tables", Regional Economics Information System. Washington, D.C., 1970-1975.

Johnson, Robert W., The Demand, Value, Economic Impact, and User Characteristics of Four Outdoor Recreation Areas in Northeastern Nevada. Unpublished Masters Thesis, University of Nevada, Reno, 1977.

Nevada Employment Security Department County Establishment Based Industrial Employment, 1970-1976.

_____, County Labor Force Summaries, 1970-1976.

_____, Economic Update January-December, 1977.

Nevada Review of Business and Economics, Winter 1977.

Nevada State Engineers Office, Water for Nevada, Volumes 6 and 8. Carson City, Nevada, 1973.

U. S. Bureau of the Census, Area Reports - Nevada 1969 and 1974 Census of Agriculture. Washington, D.C., 1972 and 1977.

U. S. Department of the Interior, Bureau of Land Management, Lincoln County Social-Economic Profile, Las Vegas, Nevada. 1976.

_____, Unit Resource Analysis, Caliente Resource Area. 1978.

Willie, John C. and Associates, Lincoln County Master Plan. St. George, Utah, May 1974.

Social Value Analysis

Chu, Shih-fan, Nevada Population by Counties, 1974, Revised and 1975 (provisional). Bureau of Business and Economic Research, University of Nevada. Reno, Nevada, March 1976.

Reichart, Loren, and James Frey, Lincoln County Value Survey. Las Vegas, Nevada, June 1976.

U. S. Bureau of the Census, U. S. Census of Population: 1960, Number of Inhabitants, Nevada. Washington, D.C., 1960.

_____, U. S. Census of Population: 1970, Number of Inhabitants Nevada. Washington, D.C., 1960.

U. S. Department of Commerce, "Local Area Personal Income," Survey of Current Business. May 1974.

_____, "Per Capita Expenditure of State and Local Governments, by Function," 1972 Census of Governments, Governments Finances. Washington, D.C., October 1974.

_____, "Selected Items of Local Government Finances for County Areas," 1972 Census of Governments, Government Finances. Washington, D.C., October, 1974.

_____, "Total Personal Income and Per Capita Personal Income by County for Selected Years 1969-73," Survey of Current Business, April 1975.

Willie, John C., & Associates, Citizen Involvement Goals and Policies. St. George, Utah, July 1974.

Infrastructures

U. S. Bureau of Land Management, Nevada Public Land Statistics. Reno, Nevada 1977.

WILDERNESS VALUE AND DEMAND REPORT

1. Here is a summary of the less technical information on wilderness demand and value of preserving area as wilderness that I am aware of.

2. It is useful to review this so as to allow the Bureau to begin to reach a consensus on what concepts and approaches will be applied to wilderness in the PAAs and ES or EARs written on the suitable areas.

3. More refinement (and less bulk) is probably needed. More technical (both from a theoretical and empirical nature) analyses are available, and with a concerted effort could be applied to BLM's Wilderness Review Program. The benefits from these more technical approaches will have to be weighed in terms of "users" backgrounds and, hence, ability to apply them.

4. Thus, the purpose of this paper is to present some general arguments for wilderness demand and value. They are useful when the methodology, as briefly discussed in the Appendix, is not applicable due to lack of data.

5. Also, I would greatly appreciate any comments or pointing out of any weaknesses of this paper. Please mark up the second copy of the paper which is included for this purpose. However, if you prefer, you could just handwrite your comments and mail them to me on a separate sheet. A phone call (801-259-6809) to point out any glaring deficiencies would also be appreciated.

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THE DEMAND FOR AND VALUE OF WILDERNESS

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I. INTRODUCTION

In an evolving field such as "environmental economics," there is a need to analyze the synergy of previous research with new research. From this analysis, it is possible to draw new insights and conclusions which were not possible by examing each article as it chronologically appeared in the literature.

The first part of this paper is an attempt to synthesize the previous research on the demand and supply of wilderness and relate these forces to the valuation of wilderness areas. Conclusions drawn from the first part will be analyzed to see what those conclusions imply about the demand for and value of new additions to the National Wilderness System. These implications are of particular importance, since the Bureau of Land Management (BLM) and Forest Service (FS) are in the midst of making resource allocation decisions about wilderness resources. To make intelligent allocations, the values of resources being traded off must be known. Thus, to elaborate the trend in value these resources have as wilderness, is another purpose of this paper.

II. DEMAND FOR WILDERNESS

There are at least three categories for which the demand for wilderness can be classified. The three most significant are option, reservation and recreation (wilderness experience) demand.

Option Demand

As applied to wilderness preservation by Krutilla, option demand is the willingness to pay or value to society of retaining the opportunity to make irreversible decisions between conversion of amenity resources into commodity resources.[1] In this context there is an option demand for wilderness, since classification of an area as wilderness leaves open the opportunity to have resource extraction or wilderness at a future date. Commitment of an area to resource extraction forecloses this future choice for that area. Increased choice opportunities for consumers implies greater utility. Hence, consumers with an option demand for wilderness stand ready to pay for this added utility. The amount they are willing to pay depends largely on their income and tastes.

A significant segment of this option demand springs from the value scientists place on retaining a relatively unmanipulated ecocsytem and genetic "pools" (in the form of wilderness) for further study.

Option demand also expresses the demand by the present generation

to give to future generations some choice in the trade-offs involved in allocation of resources to wilderness. In this respect, option demand allows the final allocation to be influenced by future generation's tastes and preferences.

Reservation Demand

Reservation demand is the demand to use the resource in the future or to pass on the right to use the resource in the future, even though no current use is made by the individual. While this could be viewed as a variant of option demand, there is a distinction. Reservation demand deals not with retaining the allocation decision option, but rather with the demand to use the resource as wilderness, but in the future period rather than now.

Reservation demand measures what individuals are willing to pay to preserve an area so they can visit this area in the future, even though they currently do not visit it. Reservation demand also measures the willingness to pay to preserve an area so that one can leave to one's children and grandchildren these "public" type goods such as wilderness areas. Recent research has attempted to measure these demands. Researchers found that these demands may add as much as 50% to the recreation value of preserving an area as wilderness. This thinking may have been the reason the BLM stated in their Wilderness Review Procedures ". . . a lack of (current) demand rationale within the short-term planning horizon . . . is not a valid reason for not identifying wilderness preservation as

management objective." An expression of these two demands is partly found in the increases in membership in such organizations as the Sierra Club, Wilderness Society and Friends of the Earth, to name a few.

Recreation Demand

A more conventional demand for wilderness takes the form of a recreationist's demand for a "wilderness experience." The categories of factors that influence a society's demand for a wilderness experience are income, tastes and preferences, price of complementary inputs, price of substitute recreation experience and population.

A significant change in anyone of these factors will result in a change in demand, i.e., a shift in the demand curve for a wilderness experience. Given this national demand, the actual quantity demanded depends on the "price" of a wilderness experience in terms of travel costs to the area. As this price changes, so does the quantity demanded for any given demand curve.

To understand the current and future trends in demand for wilderness experiences, it is necessary to analyze what is occurring and what will occur to each one of these determinants of demand listed above.

Population

The relationship of population levels to the demand for wilderness recreation is strongly positive. While U.S. population growth rates are down from their high rates during the post-war era, the population base is now so large that even the smaller rates of increase yield large absolute increases in population. This is borne out by the fact that a .7% rate of increase in 1976-1977 produced a 1.6 million person increase in population. Increases of this size each year in population, other things remaining equal, increases the demand for wilderness recreation.

The changes in geographical distribution in the population effects the travel costs incurred in visiting wilderness. The "sun belt" migration out of the Northeast to Southwest has put a larger portion of the current population closer to existing and potential wilderness areas. This reduces travel costs to wilderness areas, hence other things remaining constant, increase the quantity demanded of wilderness recreation.

Price of Substitutes

The price of substitute recreation experiences is positively related to the demand for wilderness recreation. Since most other forms of outdoor recreation have as a significant input greater

amounts of energy per hour of recreation experience than wilderness recreation, the price of substitute recreation experience will rise further as the real price of energy rises. Price elasticities of demand for ORV use are twice as high as for wilderness use. Thus, ORV usage is more sensitive to changes in price of gas, both from a total expenditure and per unit perspective. With a rising relative price of substitute recreation experiences, the demand for wilderness, other things remaining equal, can be expected to increase.

Price of Complements

The price of complementary inputs required for a wilderness experience are inversely related to the demand for a wilderness experience. These complementary inputs include backpacking equipment, amount of leisure time (wilderness might be characterized as time intensive), "cost" (time and trouble) of obtaining a permit to enter a wilderness area and transportation costs. It is well known that the amount of leisure time available is rising. The real price of backpacking equipment has been falling (due to technological breakthrough, entry of new firms and enlarged market enabling economies of scale). Transportation costs and costs of obtaining a permit have been rising. However, the demand for wilderness is quite price inelastic and thus, rising transportation costs will have a less than proportional effect on demand. It is an empirical question what the net effect really is. However,

first hand experience seems to indicate that these collective costs are falling due to the predominate influence of equipment costs in the decision to enter the "sport" and availability of leisure time in terms of the frequency of trips. Thus, with weighted price of complementary inputs falling, the demand for wilderness recreation, other things remaining equal, will continue to rise.

Tastes and Preferences

A determinant of demand which research indicates has had, and will continue to have, a strong effect on demand is tastes and preferences of the population with regards to wilderness. The demographic characteristics associated with acquiring a "taste" for wilderness recreation include living in urban areas, relatively high educational achievement and service or professional employment.[2]

An increasing number of people live, and will continue to live, in urban areas (defined as Standard Metropolitan Statistical Areas). This is due to the large percentage of the population currently living in urban areas and the continual urbanization of previously rural areas.

The trend to a service sector economy is unmistakable. Accompanying this trend is the fact that a growing percentage of jobs are service or professional types (with little physical exertion).

Educational attainment of the U.S. population is still increasing. From 1970 to 1976, college enrollments grew by 34%.[3] While the rate at which high school students immediately enter college is falling among males, it is rising among females.[4] Due to reentry of older students and trend towards obtaining graduate degrees, HEW estimates that there will continue to be increased enrollments at the national level (although at a much slower pace) till the mid 1980s. Since wilderness demand is positively correlated with educational achievement, these facts point to continued strong demand for wilderness due to educational attainment. User group studies by Hendee and Catton revealed that three-fourths of the nonteenager wilderness users are married and that, of these, 85% have children.[6] Catton believes that tastes for the wilderness are acquired, and usually at an early age, from parents, peer grounds and conservation organizations. Together, these statements indicate that a growing percentage of the national population is and will be acquiring preferences for wilderness. Coupled with this is the suggestion by Krutilla that car campers may cultivate tastes and acquire skills for wilderness related camping.[8] This would seem to be especially true of the car campers of the 1950s and early 1960s, who were able to have a recreation experience closely approximating a wilderness experience due to lack of crowds and overly developed campgrounds. To maintain this experience today, it seems plausible that many of these persons would pack into the back country. The same can be said for skills development which generally proceeds from simple car camping to wilderness camping.

From this discussion of preferences, it should be apparent that a greater number of people will be acquiring the tastes for a wilderness experience. In this way, the trend points to increased demand for wilderness recreation.

Income

Regression analysis by the Bureau of Outdoor Recreation shows that income is a significant determinant of demand for wilderness recreation.[9] Per capita, real personal income, which adjusts for inflation and population, has been, with exception of this last recession, rising steadily. This is especially true in the Western States where the level and rate of increase in per capita real personal income exceeds the nation's average.[10] This trend in the Western States is particularly important, since most of the existing wilderness and new additions to the wilderness system are in or near these Western States.

While forecasting what personal income will be in the future is not as easy as it was during the 1960s, most indicators point to continued increases in per capita real personal income, especially in the Western United States. Given the positive correlation between income and demand for a wilderness experience, it is probable that increase in demand for wilderness experience will continue due to increased incomes.

When all of these factors are taken together, one would expect to see a stampede to wilderness areas. If you have been near any of the nation's wilderness areas during the late 60s or early 70s, this would probably accurately describe a Saturday morning at a trailhead. As will be discussed later, rates of increase in wilderness use have been averaging around 10% per annum. What has been presented so far is the underlying rationale for the increases in demand for wilderness use now and in the future.

III. SUPPLY OF WILDERNESS

There has always been a rather finite supply of areas containing what we would consider wilderness characteristics. These characteristics lie along a continuum from unique geomorphological features to undisturbed forest ecosystems to common but fragile desert ecosystems.

These geomorphological features and unmanipulated ecosystems can only be created by the forces of nature over what most humans consider to be an extremely long period ot time. Given our current technology, rehabilitation of even nonunique ecosystems does not meet the criterion of the wilderness purist whose values are reflected in the Wilderness Act.

Therefore, the supply of wilderness can be characterized at any given point in time as finite or more accurately perfectly inelastic. However, over time production of commodity resources

from these de facto wilderness areas destroys their value as wilderness. Since destruction cannot be reversed, there has been a permanent reduction in the supply of wilderness. Since wilderness can also supply commodites as well as aesthetic values, it is useful to look at the characteristics of the competing supplies.

Extraction of natural resource commodities from de facto wilderness areas destroys values that have little or no substitutes, since they enter consumers' utility functions directly. The natural resource commodities do have substitutes, since they are employed in an intervening production process before the final product, not the natural resource commodity itself, enters the consumers' utility function. The consumer is willing to substitute electricity produced from nuclear power with electricity produced from coal. The same is true of paper made from recycled fibers for that made from newly cut timber. However, the discriminating wilderness users cannot substitute rehabilitated mining areas for pristine wilderness.[11]

Two implications come to our attention regarding the supply of wilderness areas. First, is that current and future destruction of wilderness areas due to extraction of substitutable commodity resources is irreversibly reducing the supply of wilderness values which have no close substitutes. Secondly, due to the nonreproducibility of wilderness characteristics, increases in future

demand for wilderness cannot be met with increases in supply (regardless of price) as is the case with almost all other consumer goods.

IV. VALUE OF WILDERNESS

Section II enumerated reasons for increased demand for wilderness areas for current and future use. Section III discussed the supply conditions of wilderness areas. From Section III, it was evident that the supply of wilderness was constantly decreasing. Taken together, it is seen that wilderness is a resource which people are demanding more and more of each year, and one which is becoming more and more scarce each year. These two forces can only imply a rising value of wilderness to society.

Do not be dismayed that the first major conclusion seemed simple to arrive at, given the preceding discussion. This was one of the aims of the analytical framework chosen to organize all of the seemingly unrelated variables and trends.

If you are in search of a less intuitive procession to arrive at the same conclusion regarding the value of wilderness, do not despair! Much more "sophisticated" work has been done in specifying the conditions under which the wilderness values of an area will will increase relative to the commodity values of an area. A brief discussion of these follow to supplement the foundation of our conclusion.

First, we specify that a wilderness experience enters a consumer's utility function directly, without any intervening production technology where as natural resource commodities enter indirectly into consumers' utility functions (in the form of final goods) only after being acted upon by a production technology. Converting natural resource commodities into final goods irreversibly destroys the wilderness values of an area.

Now we introduce technological improvements in production. We see that, at first, this has no effect on the value of wilderness. But, this process of technological improvements in production allows for a greater production of commodity resources from a given resource base.

Increases in output from a given resource base due to technological change implies increase in real income. These increases in in real income, due to the income elasticity of demand for wilderness, increase the demand for wilderness.

However, the technological improvements cannot increase the supply of wilderness (as we have used the term). In fact, a new technology which allows for economic exploitation of previously submarginal reserves might cause a reduction in the amount of wilderness available.

Again, an increased demand coupled with a reduced supply implies rising value of wilderness to society. This is sometimes labeled

"asymmetry of technological change on amenity values", and was elaborated by Krutilla.[12]

Another theoretical argument for a rising value of wilderness is given by Fisher, Krutilla and Cicchetti:

> "... for any fixed quantity (here wilderness) assuming growth in incomes, a set of conditions will guarantee an increase in price (value) to occur can be summarized as follows:
>
> if (a) present services of the environmental resource have no good substitutes among produced goods, (b) income and initial price elasticities of demand for such services are larger than for produced goods in general, and (c) the fraction of the budget spent on the environmental services in fixed supply is smaller than for produced goods in general, then relative "price" or value of the environmental services in fixed supply will increase over time relative to the price of the produced goods at those levels of use short of the point at which congestion externalities occur...." [13]

The necessary assumptions and conditions seem to be met here for wilderness, given our earlier discussions of demand for and supply of wilderness. From this discussion, we should see that (a) is true for wilderness users; since wilderness is a "luxury" type good, (b) holds and that (c) is true should be obvious.

From all of this we can conclude, at whatever level of abstraction we desire, that the value of wilderness is rising.

V. VERIFICATIONS

The preceding analysis was carried out appealing the reader's sense of logic with the aid of some basic economic theory. We now turn to some indirect evidence that the conclusions drawn on the basis of theory are consistent with actual events and, hence, will be useful for predictions of events to come.

> Fisher and Krutilla state "Wilderness recreation and recreation in undeveloped natural areas is the most rapidly growing outdoor recreation activity. It has been increasing at a rate of approximately 10 percent a year over the past several decades, without evidence of slackening."[14]

As reported by Hendee and Stankey in 1973, "Use continues to grow between 10 and 25 percent a year."[15] The authors go on to discuss the problem of attempting to maintain the wilderness experience in the face of exponential growth in the number of users. Recent work by Lucas, Lime and Stankey (1976) verifies that this growth rate has continued even through the mid 1970s.

> "Use of national forest wilderness grew an average of 10% annually between the end of World War II and 1975. Use of national park back country is also increasing - several parks reported back country use tripled or quadrupled in the last ten years."[16]

It is interesting to note that wilderness recreation continued to grow at 10% a year through 1975, since 1975 was a major recession year in this country. Is it possible that the demand for wilderness exhibits a "recession proof" demand?

One of the most recent works on wilderness written in July of

1977 by Baden and Stankey, discusses the rate of increase in demand for Forest Service Wilderness Areas since 1969 to the time this article was written (1977).

> "Nationally, Forest Service Statistics indicate about an 8% annual growth rate in wilderness since 1969. Moreover, wilderness use is growing at a faster rate than other forest-based recreation demand such as campground use."[17]

This tells us that even where some rationing is occurring in use (as it is in many of the Forest Service Wilderness Areas) that demand continues to grow strongly.

In all of these articles cited, the authors also have pointed out that they expect these rates of increase to continue unabated.

VI. IMPLICATIONS FOR EXISTING WILDERNESS AREAS

The implications of these past and present increases in demand for existing wilderness areas have been present since the early 1970s in the form of rationing of permits to use the areas. In California, to take a trip into most wilderness areas requires reserving a permit months in advance to get into the area of your choice. Without an advance reservation, it is rarely possible to get into the area of your choice when you want. Second, third and even fourth choices are necessary if the trip is ever to materialize. California is by no means unique. Back country use in Rocky Mountain National Park and Boundry Waters Canoe Area is also carefully rationed.

This trend has not gone unnoticed in the research on wilderness. Dozens of articles discussing new and different rationing systems have appeared since the 1970s. All of the various forms of rationing greatly reduce the users' freedom of choice and spontaneity. As Baden and Stankey indicate, "Freedom of choice and spontaneity of action appear to be key characteristics of what is commonly called 'the wilderness experience'."[18]

Current attempts to limit explicit degradation of a wilderness experience (crowding, area destruction) has resulted in implicit degradation of the wilderness experience (reduced freedom of choice and loss of spontaneity). In both cases, the causative factor is the shortage (at a zero entrance fee) of wilderness areas.

VII. IMPLICATIONS FOR NEW ADDITIONS TO WILDERNESS SYSTEM

Will the demand for new wilderness areas increase faster, at the same rate, or slower than for all wilderness in general? The answer to this question may significantly influence the allocation decisions between wilderness designation and non wilderness designation of Forest Service and BLM lands. In the discussion that follows, I will attempt to demonstrate that an above average rate of increase in demand for new areas is most likely.

With 10 million visitor days in 1975,[19] at a 10% annual growth rate, there will be a demand for about one million additional visitor days each year. If the current rate of increase (10%) is maintained, there will be 1.6 million additional visitor days demanded each year by 1980, which will bring the total number of visitor days to 16 million by 1980. By 1985, the additional visitor days demanded each year will be approximately 2.5 million a year, bringing the total visitor days demanded to 27.1 million.

As previously discussed, most of the existing "de jure" wilderness areas already have limitations on usage. Any discussion of rationing of use in face of these limitations implies a shortage (at the current price) of wilderness areas.

Thus, it is clear that existing de jure areas have little capacity to absorb these increases in visitor days. Any new users gaining access simply displace old users.

Therefore, almost all of these increases in visitor days of

wilderness experience demanded must be supplied out of "de facto" wilderness areas and new wilderness areas. The additional capacity present in de facto areas will be declining rapidly as the areas either become de jure wilderness areas (in which the capacity is protected) or released for intensive development. Additionally, many of the current de facto areas are receiving substantial use and may actually require a cut back in use in some areas so as to protect the wilderness resources as mandated by the Wilderness Act. It is apparent that the only significant new supply of addditional capacity to fulfill future increases in demand for a wilderness comes from new wilderness areas which currently have below capacity use. What is important to note is that much of the 1.5 to 2.5 million additional visitor days demanded each year will have to be supplied from these new areas. The source of demand for new areas might be called "spill over" demand.

Another reason for above average increase in visitor days demanded at new wilderness areas is the wilderness review process "puts the area on the map." Eventually, the wilderness review process produces information on the area's wilderness assets and makes this information available via public meetings and Environmental Statements to potential users. The wilderness review process almost has the effect of a travel "promotion" on the demand facing a new wilderness area.

Certain areas, because of their seasons of use, exhibit comple-